

ROADS *and* STREETS

UNIVERSITY MICROFILMS
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HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

A GILLETTE PUBLICATION

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February 1958



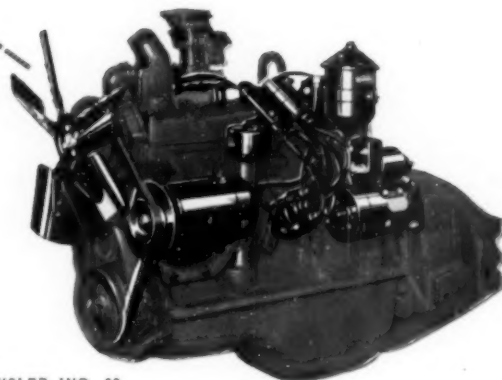
SILENT HOIST & CRANE CO. EXECUTIVES
F. E. Flynn, Chief Engineer (left) and M. M. Botnick, General Sales Manager (right) review specifications for the company's latest model Krane Kar, powered by a Chrysler Industrial 30 Engine with fluid coupling. Below, they watch the Krane Kar in operation. This model features an even greater degree of maneuverability and boom flexibility.



why Silent Hoist & Crane Co. powers with **Chrysler** Industrial Engines

**SEND FOR 1958 INDUSTRIAL ENGINE
CATALOG:** Dept. G2, Industrial Engine Division,
Chrysler Corporation, Detroit 31, Mich.

Silent Hoist & Crane Co. is a pioneer in the field of heavy-duty materials handling equipment. The famous KRANE KAR and LIFT-O-KRANE are designed for tough jobs and demanding conditions. That's why the company chooses rugged Chrysler Industrial Power. Equally important, Chrysler engines are available with fluid coupling to reduce shock load, prolong engine life. Experience has proved to Silent Hoist engineers, the superiority of Chrysler Industrial Engines. And Chrysler's reputation helps Silent Hoist sell customers—and keep them sold.



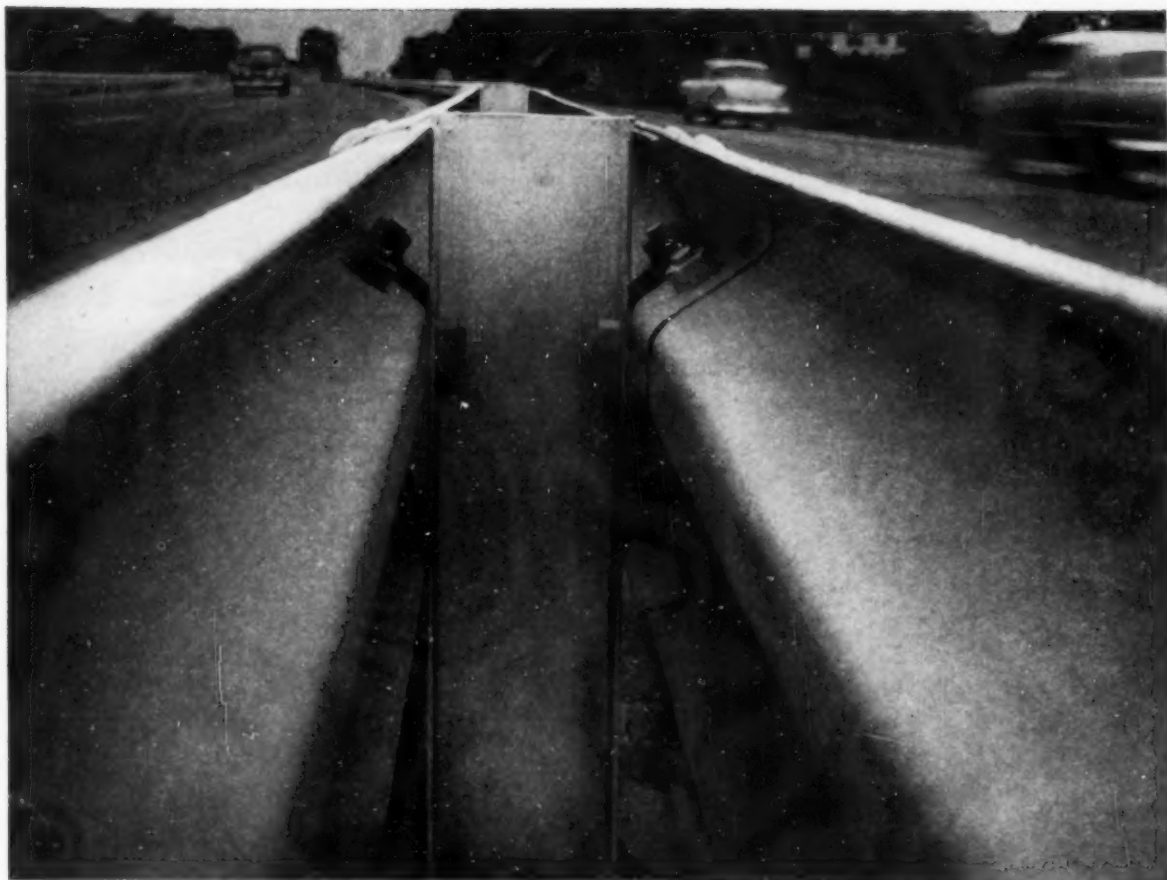
Chrysler

INDUSTRIAL ENGINES

INDUSTRIAL ENGINE DIVISION • CHRYSLER CORPORATION

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CHRYSLER IND. 30,
230 cu. inch displacement
engine powers the Krane
Kar. Heavier units are
powered with Chrysler
Ind. 33, 265 cu. inch
displacement.

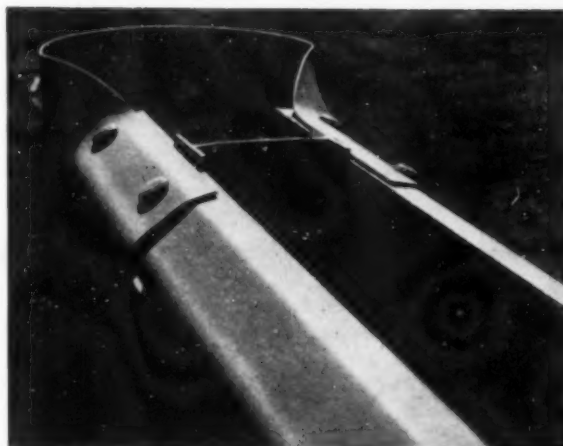


Safety Down the Middle

Mounted back to back on steel posts and installed as a median barrier, Bethlehem Beam Guard Rail provides a double strip of steel, strong enough to withstand severe shocks from colliding vehicles from either side. Yet it is flexible enough so that in most cases, the vehicle is redirected parallel to the rail with minimum damage to vehicle and rail.

Beam Guard Rail comes in standard 12 ft 6 in. lengths of either 12 or 10 gage steel. However, lengths and fitting-up specifications can be adopted to any need. Currently, Beam Guard Rail is installed as median dividers on the Pennsylvania Turnpike, New York Thruway, Connecticut Turnpike, New Jersey Turnpike, the Merritt Parkway, and highways in Illinois, Maryland, and other states.

We will gladly send you our new booklet "Bethlehem Beam Guard Rail," No. 435, which gives full details and specifications. Just contact the nearest Bethlehem sales office, or write to us direct at Bethlehem, Pa.



Specially-rolled end-fitting protects double row of rail

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
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ROADS AND STREETS, February, 1958

ROADS AND STREETS

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Interstate Project Series

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Aggregate Production

Continuing with case reports on stone production in the highway program, and how contractors are meeting their problems.

Airport Runway Concrete

How close tolerances are being met on typical military runway paving project.

Prestressed Bridges

Handling big precast girders for bridge at Vancouver, B.C. . . . Example of long prestressed piles for bridge piers.

Also Coming Along Soon—

Sand fill design and construction for Chicago's Toll Skyway . . . Also a review of the Skyway's heavy pavement design and high speed placement . . . More notes from winter conventions.

Look for this nearby,
Goodyear dealer sign
for better tire values
—better tire care.



In the mountains of Guatemala, the last links are being forged in the 3,179-mile right-of-way from Texas to Panama. Landslides (as shown below) are the order of the day—but early in '58, the first wave of American tourists is due to swap dollars for blankets, bananas and local color! Two ten-hour shifts push the work forward, and Goodyear tires—Hard Rock Lug, Sure-Grip Lug and All-Weather Earthmover—help keep the job rolling, faster, surer and at lowest cost-per-mile.

UP TO MILLION YARDS A MILE BEING MOVED

TO COMPLETE PAN-AMERICAN HIGHWAY!



Watch "Goodyear Theater" on TV—every other Monday 9:30 P.M., E.S.T.

Tires move more yards for less when built with **Triple-Tough 3-T Nylon Cord!**

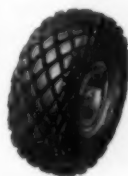
ALL 3-T NYLON CORD—Tubeless or Tube-Type



**HARD ROCK
LUG**



**SURE-GRIP
LUG**



**ALL-WEATHER
EARTHMOVER**



Like steel, tire cord must be tempered to be tough. Goodyear's exclusive 3-T process, involving Tension, Temperature and Time, triple-temperers cord to make it TRIPLE-TOUGH—to give you longer tire life, lower cost-per-mile.

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ROADS AND STREETS, February, 1958

Known as "the greatest tire SAVER in 23 years," Triple-Tough 3-T Nylon Cord is a Goodyear exclusive.

During years of use, on the toughest jobs on earth, Goodyear 3-T Nylon Cord tires have literally saved *millions* for contractors and truckers who realize that the final cost of any tire depends entirely on *what they get out of it*.

The fact that more tons are hauled on Goodyear tires than on any other kind, certainly suggests that most operators get more yards-per-dollar, more miles-per-dollar, on Goodyears. If *you're* not already using Goodyear 3-T Nylon tires on your equipment, try them! Goodyear, Truck Tire Dept., Akron 16, Ohio.

Buy and Specify

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

All-Weather, Sure-Grip—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

PRESSTITE[®] No. 99^{*}

**THE TOUGHEST,
MOST ECONOMICAL
SEALER AVAILABLE
for AIRFIELD
PAVING JOINTS**

- Resists being **BLASTED OUT** by terrific jet engine thrust.
- Resists **MELTING** and **BLOWOUT** from super-elevated temperatures from jet after-burners.
- Resists **SHOCK** and **IMPACT** from heavy aircraft.
- Unaffected by jet fuel spillage.

WRITE for
illustrated copy of
Bulletin 99

- A Two-Component, Cold-Applied Sealer
- For Sealing Sawed and Formed Joints

* Meets
Federal Specification
SS-S-170,
23 May 1955



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ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 65 years of continuous publishing in the highway field; combined with Engineering and Contracting and Good Roads Magazines, established in 1892.

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Doing as much as three power shovels and a dragline, this TD-18 4-In-1 dug up, and loaded, up to 1,700 feet of old concrete pavement daily—for Henry E. Berghuis, Prinsberg, Minnesota. Famous pry-action break-out makes the big difference over other rigs!



Don't let a single-action loader hold you up... see how a 4-in-1 multiplies your profit-range by four!

You've got a gun in your back two ways—with an old-style, single-action "dip-and-dump" tractor loader!

It holds you up on price, by giving you only the one machine action for your money. It hijacks profits, by sharply limiting job range and capacity.

Now, see what a contrast, in multiplied value and earning power, an International Drott 4-In-1 offers!

4-machine utility — one-machine price!

An International Drott 4-In-1 gives you four built-in, multiple-duty, big-capacity machine actions, for only a one-machine price. Your fingertip command, through the "machine-selector" lever, instantly puts any 4-In-1 action you need at your service.

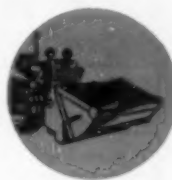
Skid-Shovel action gives you exclusive, "concrete-smashing" pry-action break-out—with famous bucket-heaping, ground-level roll-back. "Carry-type scraper" is your accurate grading, stripping, spreading, or compacting action. Clamshell action provides one-gulp "stand-and-fill" ability, plus hopper-high, self-cleanout, bottom-dumping. Bulldozer action delivers aggressive, big-yardage, earth-rolling ability.

Ease into the foam-cushioned seat—prove that your 4-In-1 investment will multiply your job-taking, money-making ability. And compare the performance protection of exclusive shock-swallowing Hydro-Spring

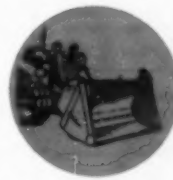
to unprotected hose-bursting, machine-mauling "lunge-and-lift" design. Ask your International Drott Distributor to demonstrate the top buy, by far, in the construction machinery world: the 4-In-1 size that fits your needs!



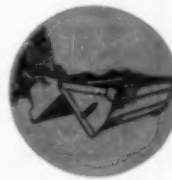
Bulldozer...with clam lip up and shoes on the ground, it's a big-yardage, earth-rolling blade!



"Carry-type scraper"...that grades, strips, or spreads with inch-close accuracy.



Skid-Shovel...with Drott's exclusive pry-over-shoe break-out and ground-level roll-back.



Clamshell...that fills itself in one fast gulp—gives you hopper-high, self-clean-out dumping.

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin



INTERNATIONAL
DROTT



At Western National School, they learn the A, B, C's of equipment operation

Lubricants Used in Western School's Equipment

Application	Lubricant	
Engine lubrication	Texaco Ultra Oil Super Duty Special	Makes engines deliver more power with less fuel over longer periods between overhauls
Chassis, wheel bearings and general grease lubrication	Texaco Mafak	Stays in the bearings; gives long-lasting extra protection against wear and rust
Track rolls	Texaco Track Roll Lubricant	Seals itself in, seals out dirt and moisture.
Hydraulic units	Texaco Regal HLT HEO	Keeps systems free from rust, sludge and foam
Wire rope and apex gears	Texaco Crater	Keeps wire rope strong longer, assures smoother operation and longer gear life
Enclosed reduction gears	Texaco Gear Lube HD	Protects against wear under heavy loads, keeps gears running smoothly.

It doesn't take long for students at Western National School of Heavy Equipment Operation, Weiser, Idaho, to realize there's more to grading or bulldozing than moving dirt. They soon find out that a contractor's earth-moving equipment is expensive—and requires the best of care.

At Western, the fundamentals of equipment maintenance are drilled into every student. Among other things, students learn that good lubrication practice usually involves only a few well-chosen lubricants. In fact, the school itself maintains a highly efficient lubrication program by using only six Texaco products for all major lubrication—and using them exclusively.

Because of this training, Western graduates



FIRST DAY OF SCHOOL at Western begins with a look at the equipment students will operate. Western offers 4-week courses in the operation and care of graders and tractors and an 8-week course for cranes—plus a special 8-week course on construction equipment maintenance and repair.



WESTERN NATIONAL'S EQUIPMENT, valued at nearly \$250,000, moves all kinds of dirt, day after day and in every kind of weather. School relies on Texaco fuels and lubricants exclusively to keep equipment operating "like new."



MAINTENANCE INSTRUCTION is an important part of Western's curriculum. Students get plenty of classroom and night work but spend two-thirds of their term in the field under the supervision of competent, experienced instructors.

and maintenance

make good all 'round operators of graders, scrapers, cranes and tractors—the kind who can handle and care for your equipment properly, and keep it on the "go."

A Texaco Lubrication Engineer helped Western National School work out a Simplified Lubrication Plan for its diversified equipment. He can help you set up an economical, efficient program, too. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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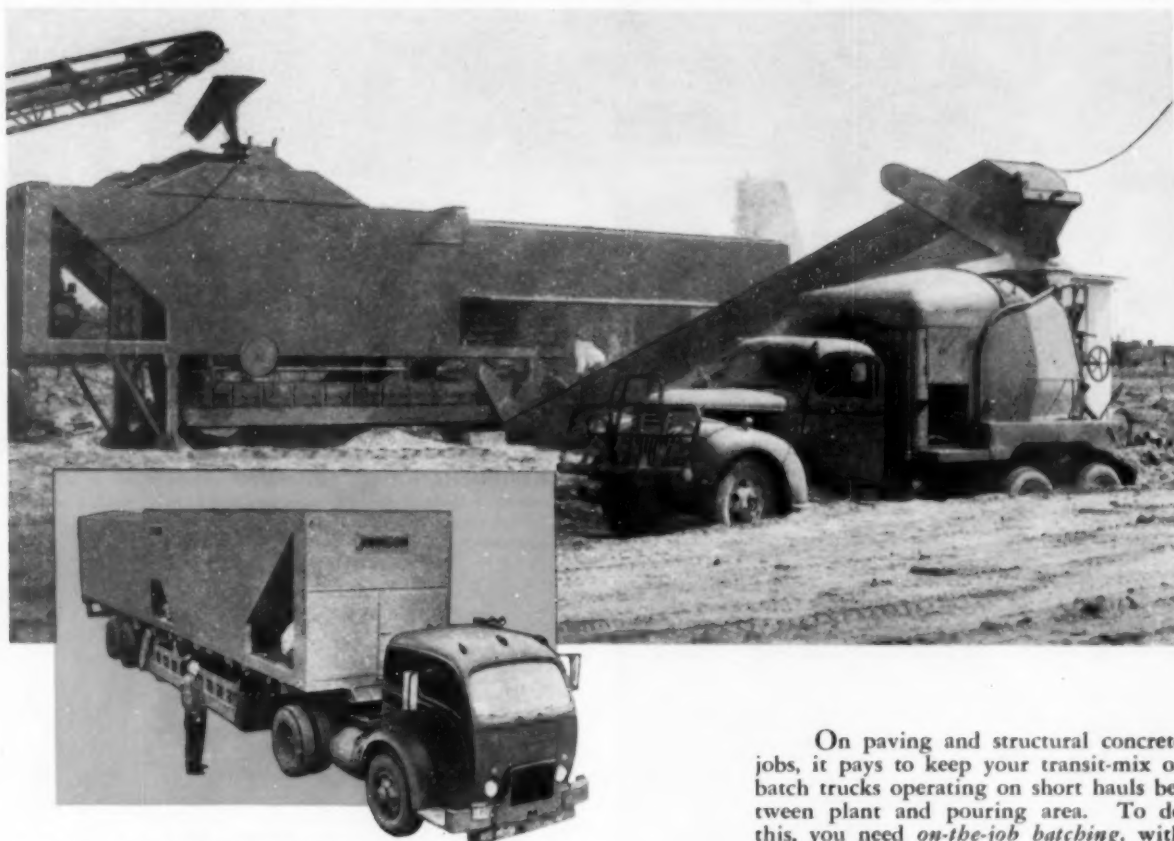


LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

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A BIG batch plant with PICK-UP-AND-GO portability



Johnson® PORTO-BATCHER® specifications:

- ▶ Capacity, 4-compartment aggregate bin: 39 cu. yds. heaped — 46 yds. with 12-in. sideboards.
- ▶ 200-bbl. cement compartment; 650-gal. built-in water tank.
- ▶ Full-automatic interlocked batch control with repeater.
- ▶ 4 aggregates are weighed in 2 hoppers — with 2 aggregates in each hopper.
- ▶ 2 aggregate scales have two 2,000-lb. weigh-beams each.
- ▶ Cement is weighed in separate, covered hopper — equipped with a 1,000-lb. weigh-beam scale.
- ▶ Enclosed discharge conveyor has 11'6" ground clearance for transit-mix trucks; 8'10" clearance for batch trucks.
- ▶ 230-bbl.-per-hour cement elevator with boot hopper, or screw conveyor; undertrack shrouds, or truck hopper.
- ▶ All internal wiring factory-installed, complete with starters, circuit-breakers in panel, motor controls, etc.

On paving and structural concrete jobs, it pays to keep your transit-mix or batch trucks operating on short hauls between plant and pouring area. To do this, you need *on-the-job batching*, with convenience in moving your plant from one site to the next — and *here's your opportunity!*

With a Johnson Porto-Batcher, you just pick up *and go* — get set at new site, ready to work in as little as a day's time. It consists of 3 portable trailer units on wheels: main plant, discharge conveyor, cement elevator — complete with 5th-wheel-plate or towing eye, brakes, lights, etc. Main trailer width is 8½ feet — height 12½ feet — length 44½ feet. No complicated re-assembly, heavy concrete pedestal foundations or high lifts, as with conventional stationary plants. Porto-Batcher produces 60 to 80 batches an hour, depending on size of trucks and batch quantities. You just set the weigh-beams and water-pointer — set repeater for number of batches needed — press the starter button, and Porto-Batcher weighs out the exact number of batches *automatically*.

Want more facts on Porto-Batcher? Call Johnson distributor or write us today.



J805

CONCRETE PLANTS • BINS • BATCHERS • SILOS • ELEVATORS • CONVEYORS • CONSTRUCTION MIXERS • BUCKETS

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C. S. JOHNSON CO.
Champaign, Illinois
Stockton, California
(Keehring Subsidiary)



Small wheel-type Trenchliner® added to Parsons® line

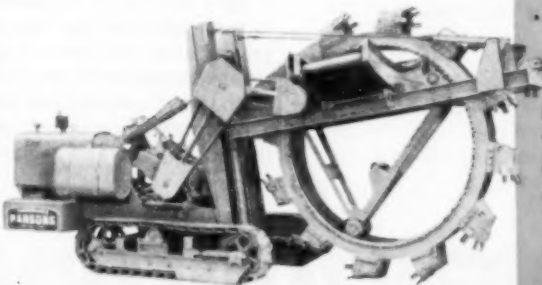
With NEW 130 you get:

- cutting widths — 12" to 24"
- maximum digging depth 5'9"
- shiftable, reversible conveyor; optional hydraulic drive
- 30 digging speeds from 12" to 18 lineal feet per minute
- heavy-duty cast-steel buckets
- double-point "Tap-In" teeth — self sharpening, reversible
- quick-change gumbo buckets
- retractable bucket-cleaner
- hydraulic wheel-hoist on power-tilt mast
- 12" crawlers, integral pad and rail-type. Optional: 16" grouser, 12" flat shoes
- 52 h.p. gas or 57 h.p. diesel

Looking for a good, small, wheel trencher in the "low-budget" range? Then check the new 130 Trenchliner. It's economy priced — yet, is built to the same heavy-duty, high-quality standards of larger Parsons Trenchliners.

Rounding out a complete line of wheel-type machines, this small, low-cost 130 digs 12 to 24 inches wide, at depths to 5¾-feet — profitably handles all kinds of drainage, pipeline, and utility trenching. It's efficient on highway-widening, too! Hydraulic control raises and lowers the digging wheel on a vertical mast — maintains precision grading accuracy at any depth. A separate hydraulic ram tilts the mast — balances the wheel forward when traveling or trailer-loading. Check its other operating advantages and features listed here — then have your Parsons distributor demonstrate what new 130 Trenchliner will do for you. 4 larger wheel-types also available, including "big-inchers" and "middle-inchers".

Also included in the big Parsons line are all sizes of ladder-type machines, on crawlers or rubber tires. For any size trench — 8 inches to 6 feet wide — depths to 19 feet — there's a Trenchliner to fit all your requirements.



Mail to: PARSONS Company, Newton, Iowa
Please send more information on new
130 Trenchliner

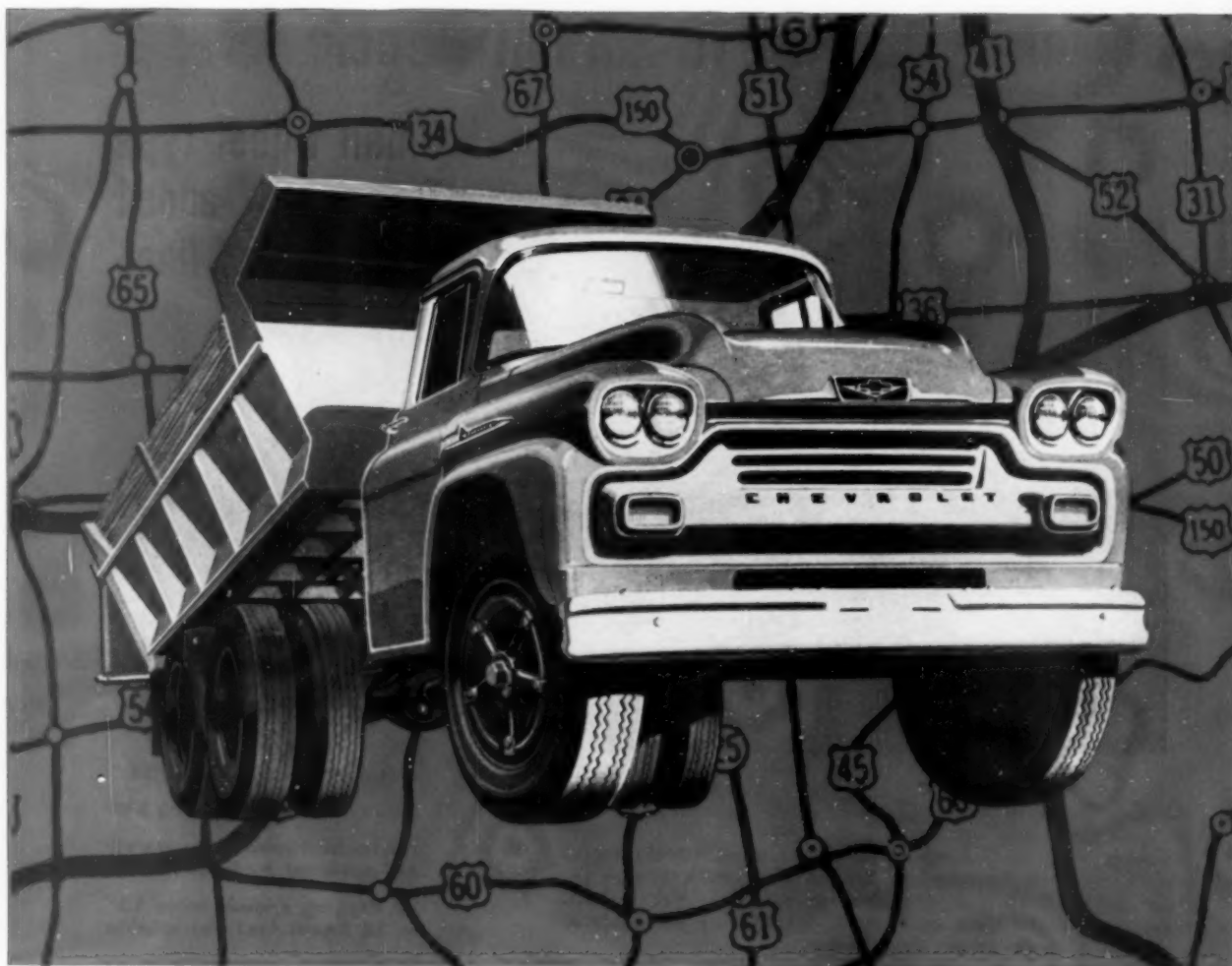
NAME _____
TITLE _____
COMPANY _____
DEPT. _____
STREET _____
CITY _____
STATE _____

PM03-55



PARSONS TRENCHLINER

A division of
Kochring Company



Never before has Chevy been

Here's a truck specially designed to take to your kind of work like a duck takes to water! It's Chevrolet for '58 with new hustle, muscle and style that mean money in your pocket!

As you can see, Chevy's a honey of a truck this year, and that handsome, broad-shouldered '58 appearance only hints at the host of new and improved features that are ready to put you dollars ahead in the years to come. *Here's a truck ideally suited for haulers in your line of work.* In styling, for instance, Chevrolet for '58 has what it takes to build your business prestige every day in the week: new dual headlamps, new massive grille, newly contoured hood, new cab beauty, to mention just a few innovations.

And what workers these new heavyweights are! There's new power to whip mammoth hauls from the industry's newest engine, the 230-h.p. Work-



NEW CHEVROLET



so right for road builders!

master V8* with revolutionary Wedge-Head design. This engine is new and different right down to the core. The combustion chambers, for instance, are *wedge-shaped* and located in the cylinder block rather than in the cylinder head. And the cylinder block is machined to a 16-degree slant, while the piston heads are peaked rather than flat, as in most other engines. This design gets maximum combustion turbulence from fuel, maximum power and mileage from each drop of gasoline burned. It equalizes the work loads on pistons to smooth out performance and reduce engine wear.

G.V.W.'s go all the way up to 36,000 lbs. on

Triple-Torque tandem models for big, profitable payloads. And these trucks come equipped with the toughest of big truck chassis components, either as standard equipment or as extra-cost options: Powermatic transmission, cast spoke or disc wheels, air-hydraulic brakes, full-air brakes or big Hydrovac power brakes, and smooth Synchro-Mesh transmissions to meet your needs precisely.

There are many such reasons why Chevy's never been *so right* for your work—many more reasons why you'll want to see your Chevrolet dealer soon! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**Featured in Series 90 and 100.*

TASK • FORCE 58 TRUCKS

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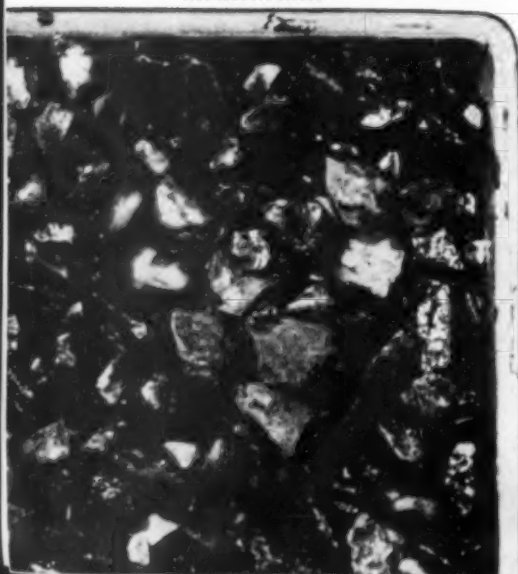
ROADS AND STREETS, February, 1958



REDICOTE®

**Rejects water and binds asphalt
to any aggregate**

Without Redicote



New defense against stripping! In a simple, dramatic test, two pans of asphalt-coated damp aggregate for pavements were subjected to a steady spray of water. One asphalt contained Redicote, Armour's new additive—the other didn't. The asphalt containing Redicote did *not* strip. Here is convincing proof that Redicotes increase the stability and durability of asphalt pavements.

With Redicote



Armour's asphalt additives prevent stripping— lock asphalt onto even water-soaked aggregates— give you extra months of paving time each year.

As little as 0.3% of an Armour Redicote asphalt additive in your asphalt formulation means the asphalt will stick and stay—even to wet and difficult-to-coat aggregates. You save money because you can use a much wider selection of locally available aggregates, and Redicotes work equally well on acidic or basic aggregates and gravel.

Redicotes reduce the need for pre-treating aggregates. They increase the efficiency of emulsified products and enable you to lay asphalt regardless of weather conditions. You can start earlier in the spring and work later in the fall. Whenever you pave, wherever you pave—Redicotes will prevent stripping.

All Redicotes are guaranteed uniform. One of three basic formulas will meet any asphalt requirement—hot or cold.



Look how Redicote 75 passed the Pennsylvania Wet Aggregate Coating Test! Only 0.4% Redicote 75 was added to MC-3 asphalt. No additive was added to the "control" asphalt. Then Pennsylvania aggregate was coated with the two mixtures under water. After mixing, the aggregate coated with asphalt containing Redicote still had a 95% coating. The "control" aggregate retained only 25% of its asphalt.

It is not necessary to modify the Redicotes or tailor-make a new asphalt formulation for every different paving situation. Speed and efficiency are substantially increased.

Redicote 75 is a 100% active, anti-stripping material. It is recommended for cold mix asphalt cutbacks where stability to extreme storage temperatures is not required. Both Redicote 75 and 2323 have proven to be outstanding wetting and bonding agents under the most adverse weather conditions.

Redicote 2793 is a 60% active anti-stripping additive, probably the most economical you can use for many aggregates. Its versatility, price and concentration required result in an asphalt additive that is right for most jobs.

Redicote 2323 was developed to meet the need for an anti-stripping additive where heat stability is important. It maintains its effectiveness after being subjected for 7 days to asphalt temperatures as high as 450°F. Ideal additive for cutback asphalts.

Samples of the Redicote asphalt additives are available for your evaluation and testing. We also would like to send you a copy of our *new* Redicote booklet which describes the Redicotes in detail.

Molecules of the Redicotes attach themselves with incredible force to stone surfaces, whether there is moisture present or not. The cationic surface active agents in Redicote squeeze away the water, and the "tail" of each molecule holds on to the binding asphalt with great tenacity. They actually change a water-accepting surface to an asphalt-accepting surface—and stop stripping before it begins.



Leader in Progressive Fatty Acid Chemistry



ARMOUR CHEMICAL DIVISION

© Armour and Company • 1355 West 31st St. • Chicago 9, Ill.

I want to learn more about Redicote Asphalt Additives!

Please send me: ☐ The new Redicote booklet.

☐ Sample of Redicote 75; ☐ Redicote 2793; ☐ Redicote 2323.

☐ Additional data on Armour Redicotes. I am interested in coating the following type aggregate:

NAME _____

TITLE _____

FIRM _____

CITY _____ STATE _____

Offer Limited to North American Continent

Armour Chemical Division • 1355 W. 31st St. • Chicago 9, Ill.

RLS-2-58



Why a TD-24 'dozes full blades *where other rigs spin and*

You don't have to jockey around, or settle for "shirt-tail" loads, or get only part-capacity performance, when you concentrate the International TD-24's full rock-slamming power—right where you want it!

You don't waste time, and fuel, and tractor life with rear-end "sluing." You don't have to "paw dirt" and then wind-up "nibbling," instead of blading out full bites. You don't lose momentum and let the blade lose part of the load every time you steer. Not with TD-24 "follow-through"!

Exclusive International Planet Power steering makes the big difference.

"Dead-track drag" is eliminated


You don't "half-kill" your power and traction to guide the TD-24, as you must with any king-size steering clutch tractor. Instead, Planet Power steering gives

you full-time "live" power on both tracks while turning—or while "equalizing" to steer accurately with offset loads. And the TD-24 handles the same big loads on turns or straightaways!

Besides, the TD-24 gives you cycle-speeding, on-the-go Hi-Lo shifting. You adjust speed to the load without stopping, going forward or in reverse. You speed up the shuttle-dozing cycle, take full-time advantage of the TD-24's full capacity!

The fingers of one hand control these TD-24 performance exclusives!

Watch a TD-24 perform—see why rock-movers call it the "rock-dozing special." Visualize how this load-control and bonus capacity make the TD-24 the ideal pusher, or outstanding for non-stop, big scraper pulling! See your International Construction Equipment Distributor for a demonstration.



Put one track in high range, the other in low—and the TD-24 pushes straight ahead, despite the tremendous offset load of benching-out unshot rock strata. P. C. Cooper, Blountsville, Tennessee, first rented this TD-24—then bought it because of its rock-'dozing performance!



An 8-unit TD-24 fleet owned by Rusciano and Sons Corp., replaced 8 big competitive crawlers—because TD-24 performance "measured up" to the toughness of this big road job. There was a considerable tonnage of granite and other rock to bulldoze—on the White Plains (N.Y.) Section of the 'Cross Westchester Expressway!

"With the TD-24, I can outwork any other machine where you have to push and turn with a big load," declares Operator Dan Olmstead, for Gibbons & Reed, Salt Lake City, Utah. "The TD-24 keeps the load moving, because you don't lose power braking a track." The TD-24 is spreading rock on a tough million-yard project—widening U. S. 40 in the Truckee River canyon near Reno.

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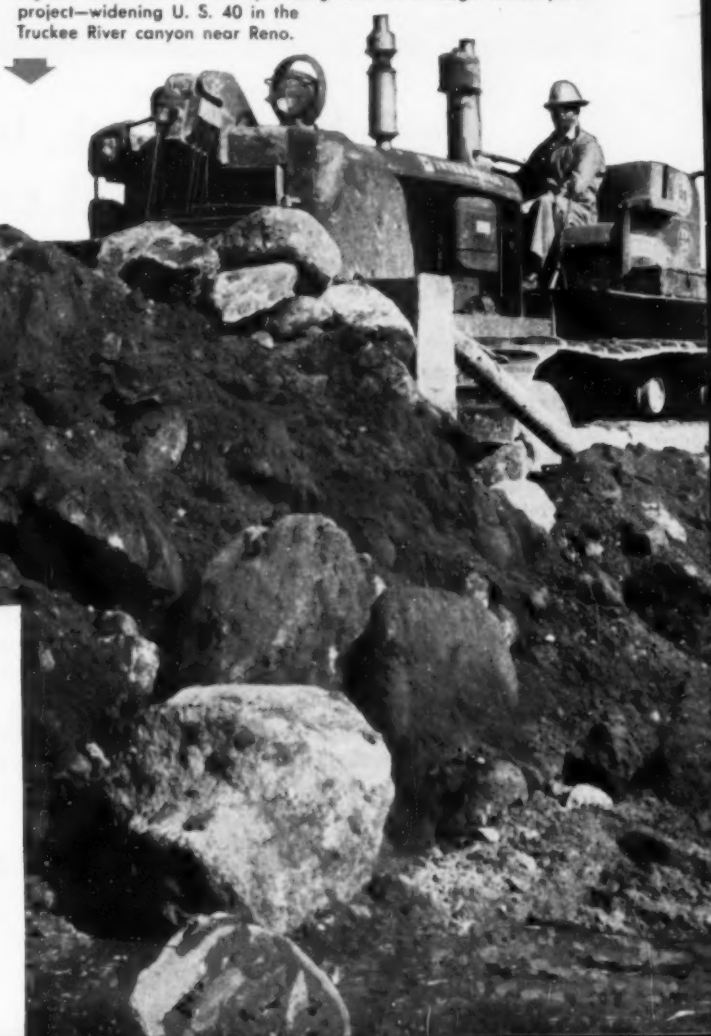


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You'll make good time in tough rock with these bits, too. But carbide insert bits may not be your best bet for every job. In ordinary ground, where you can drill out full increments of steel and do proper and controlled bit reconditioning, you'll

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Multi-use or carbide insert, Timken bits save time for your drillers because they are interchangeable in the same thread series. When drilling conditions change, you can change bits without the trouble of changing drill steels. And Timken bits last longer because their special shoulder union protects threads against drilling impacts.

To assure the quality of Timken bits, we make them from our own electric furnace, Timken fine alloy steel. No other American bit man-

ufacturer takes this extra quality control step. Let us recommend the right bit for your next job. Just call or write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, O. Cable: "TIMROSCO".



Timken threaded multi-use rock bit



Timken threaded carbide insert rock bit

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ROADS AND STREETS, February, 1958

ROADS AND STREETS

Sixty-Five Years of Editorial Leadership

Washington News Letter



By Duane L. Cronk

February 10, 1958

The National Highway Program burst back into the headlines last month as a major domestic issue. On capitol hill and in the annual convention of the American Road Builders Association, Washington was the scene of some disturbing revelations, some serious re-appraisals, and an enlightening insight into the future of the industry. In rapid succession, these things happened:

- The Bureau of Public Roads revealed that it will cost at least \$40 billion to construct the 41,000-mile National System of Interstate and Defense Highways and that it may take 20 years to do the job.

- A Senate investigating committee heard charges that some state highway departments are over-designing their Interstate roads and that the federal Bureau of Public Roads is meddling too much in local state-contractor relations.

* * *

- Also the BPR announced, for the first time, an estimate of what the road-building market will be in 1958, thus offering a glimpse, at least, at the industry business that lies ahead in 1959, 1960 and 1961.

- Senator Gore protested vehemently against any "stretch out" of the original 13-year Interstate program to 20 years and promised a "relentless battle" to keep the construction effort on schedule.

- Congressman Fallon introduced legislation which would boost federal aid to the ABC Systems from \$875 million to \$925 million a year.

- The BPR reported that reimbursement of the states for toll roads and free roads already built to Interstate System standards would cost nearly \$5 billion, thus kicking off a major debate.

- The Administration proposed amendments to the Federal-Aid Highway Act that would siphon off \$68 million a year to be used for other purposes, and, in the course of the program, take \$752 million out of the Highway Trust Fund.

* * *

The highway industry has been speculating for weeks on what the new estimate would be to complete the big Interstate System. The Bureau of Public Roads made a "guesstimate" back in 1955, but it turned out to be merely a total of individual state "guesstimates." Congress asked for a new survey in the '56 Act, and told the Bureau to check and re-check the state figures this time. Last month Secretary of Commerce Weeks announced the results to a Senate investigating committee.

(continued on next page)

It will cost \$37.6 billion, he said, to construct the 38,548 miles of the Interstate System then designated when the estimate was made. To this must be added the cost of the 2,102 miles designated since and of the 350 miles still undesignated. The total bill will come to at least \$40 billion for the whole 41,000-mile network. The 45 percent increase dismayed the senators, even though it was not entirely unexpected.

"We knew we were going to get hit," one senator told Roads and Streets.
"But \$40 billion is quite a blow."

Congress will accept the cost figure after appropriate questioning, most observers expect. But the Congressmen definitely don't want to discuss anything as distasteful as how to raise the additional \$13 billion needed. Not this year. All of the members of the House and 32 members of the Senate are up for election.

* * *

The new estimate is extremely significant. It is slated to become the basis for dividing future federal appropriations to the states, marking a complete departure from the old formula of population, mileage and area. When the 1960 Interstate funds are apportioned late this year, each state will be given its share on the basis of "need" - what it has estimated it will need to complete its segments of the System. For some states, this will be much more than they would receive under the traditional formula; for others, much less. But there seems to be little argument that this is the fairest way to divide the "kitty," and the only way to advance construction uniformly around the country.

What caused the 45 percent increase in the Bureau's estimate? Mr. Tallamy listed four factors in addition to the added mileage: (1) Traffic forecasts for 1975 are 15 percent higher, necessitating more traffic lanes throughout the big network than originally anticipated. (2) Higher design standards, plus 63 percent more interchanges, grade separations and service roads to serve local traffic, will call for an estimated 15 percent increase in the total work to be done. (3) Spiralling construction costs account for another 12 percent increase in the estimate. (4) Utilities relocation, lighting, signing, etc., total 3 percent more.

* * *

The reliability of the estimate was immediately questioned by several senators who remembered glaring inconsistencies in the 1955 survey. For example, Pennsylvania's first estimate was only \$700 million, compared to New Jersey's \$1,357 million. The new compilation shows Pennsylvania's estimate nearly doubled to \$1,310 million and New Jersey's reduced to \$1,040 million. Federal Highway Administrator Bertram Tallamy assured the Committee that the Bureau will stand back of this one.

A breakdown of the new estimate indicates that nearly \$32.8 billion (or 83% of the total cost) would go into construction, leaving about \$1.4 billion for preliminary engineering (3.5%) and \$5.3 billion (13.5%) for right-of-way.

* * *

Charges that Ohio is over-designing its Interstate roads were aired before the Senate Subcommittee on Roads last month. It was reported that county engineers had complained that the state highway department's freeway standards were "wasteful and extravagant" and would add from 20 to 100% to the cost of the System.

A SHARP LOOK AT 1958

For the first time, the Bureau of Public Roads has released a prediction of what the federal-aid roadbuilding market will be for the year ahead. G. M. Williams, chief of the bureau's Engineering Division, told an audience at the ARBA convention last month that contractors can expect to see contracts for \$2,745 million worth of federal-aid work advertised this year. He broke it down as follows (in millions of dollars):

Type of Work	"ABC" Systems		Interstate System		Total	
	Cost	Miles	Cost	Miles	Cost	Miles
Grading & drainage	\$ 85	2,220	\$ 150	720	\$ 235	2,940
Low-type surfacing	470	18,260	15	85	485	18,345
High-type surfacing	640	4,750	565	1,420	1,205	6,170
Bridges	340	110	480	50	820	160
Totals	\$1,535	25,340	\$1,210	2,275	\$2,745	27,615

Mr. Williams' estimate is significant. It makes possible a conservative estimate of the total roadbuilding market for 1958 and, beyond that, something of the prospects for other years just ahead.

A \$2,745 million federal-aid program of contract awards this calendar year would be an increase of 10 percent over the \$2,500 million worth let in 1957. The non-federal program - awards by the toll authorities, the counties, the cities, and the states "on their own" - will probably not rise proportionately with the federal-aid program.

Total contract awards this year will top \$5 billion, however. This is a good healthy growth. Certainly not the boom anticipated by so many when the National Highway Program was adopted, but nothing to grumble about, either. The state highway departments are supposed to really hit their production with the new engineering methods - the tellurometer, aerial photogrammetry and electronic computers.

(Next month: "What about next year? 1960? 1961?")

(Continued from preceding page)

Federal Highway Administrator Tallamy told the senators that the Interstate standards must be considered only a minimum and that all states are being encouraged to design to higher standards, within reasonable cost limits.

"I think the United States would be terribly criticized if we designed a system of highways following those bare minimums," he insisted. It would be the biggest mistake we could possibly make."

(continued on next page)

Vermont officials appeared before the committee to complain that the BPR has intervened unnecessarily in a disagreement between the state and a nationally known contractor. (See Washington News Letter, January issue.) The Bureau is withholding federal aid to the state because the highway department disqualified the roadbuilder for so-called "sharp and unethical practices." The New England delegation told the senators it wants to be free to ban contractors who, in their judgment, are too shrewd for the local Yankees.

"We would just about have to double our usual supervisory forces on the job," one official said, if such contractors were permitted to become successful bidders. And the nationwide result would be "billions of dollars" added to the cost of construction.

The Bureau has kept an eye peeled for any misuse of federal funds, Federal Highway Administrator Tallamy told the committee. He cited three cases where alleged right-of-way frauds had been discovered and prosecuted. In Indiana, Arizona and Oregon, agents have been apprehended for attempting to defraud their highway departments. Only one contractor has been found guilty of violating the new federal law against collusion, Mr. Tallamy testified. In Arkansas recently, a contractor and resident engineer apparently conspired to certify falsely the quantity of materials delivered to the job. Both were sentenced to 30 months' imprisonment.

* * *

One of the strongest voices in the U.S. Senate was raised last month against any move to "stretch-out" construction of the National Interstate System to 20 years. Senator Albert Gore, Chairman of the Subcommittee on Roads, took sharp issue with the assumption that the original 13-year completion date cannot be met.

"This is faint-hearted and defeatist," he told an ARBA convention audience. "We don't have to accept this."

What to do about it? The Tennessee legislator had some prompt suggestions:

"The first thing we should do is preserve the integrity of the Highway Trust Fund," he said. "It is strange to hear the same people who suggest a 20-year stretch-out advocate the annual diversion of \$68 million from the Trust Fund. The first thing we can do is appropriate sufficient funds to keep our National Highway Program on schedule. Next, if need be, repeal the unnecessary Byrd amendment."

* * *

With all the hub-bub on the Senate side, there was little publicity for a bill introduced in the House by Congressman George Fallon to continue federal-aid another two years for the regular ABC Systems. True to a promise made two years ago, Congressman Fallon, chairman of the Subcommittee on Roads, would boost the federal contribution from the existing \$875 million annually to \$900 million for 1960 and \$925 million for 1961. The Fallon measure would provide the following amounts:

Primary System	- \$405 million in '60;	\$416,250,000 in '61.
Secondary System	- \$270 million in '60;	\$277,500,000 in '61.
Urban Extensions	- \$225 million in '60;	\$231,250,000 in '61.

As in the past, these funds would be matched 50-50. In addition, Fallon recommended \$103 million annually for public domain roads - no matching required.



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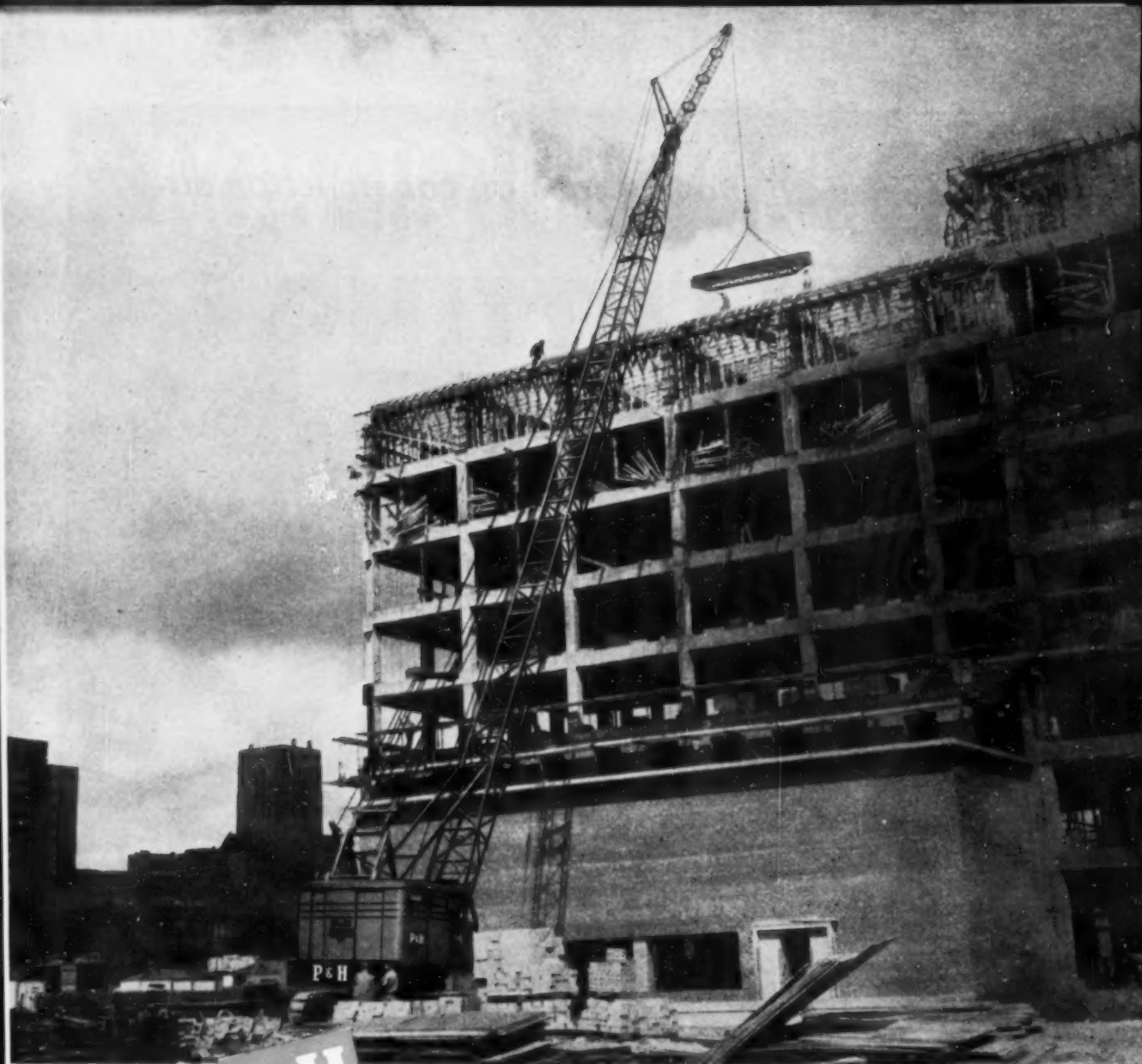
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Other features Bob Michael likes about the "855" is the

P&H planetary boom hoist which raises and lowers the boom under power. It gives him the $\frac{1}{4}$ inch he needs for real precision work. And with the P&H live roller circle, he can swing right along with the men as they keep their hands on the concrete bucket and pour.

For high and heavy lifting, no other machine in the 50-ton class can match the workable capacity, speed, stability and accuracy of the P&H 855B-LC with long crawlers. That's why when owners and operators get together they agree on P&H!

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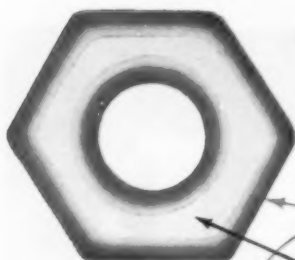
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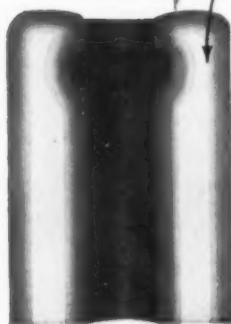
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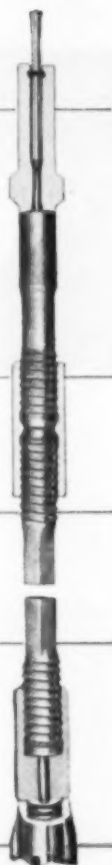
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Recommended Drill Size	3" and smaller	4" and smaller	4" and 4 1/2"	4" and 4 1/2"	5 1/2"
Recommended Bit Size	1 1/8" to 1 1/2"	2" to 2 1/4"	2 1/4" to 2 3/4"	3" to 4"	4", 4 1/2" and 5"
Rod Sizes	3/8" Hex.	1" Hex.	1 1/4" Hex.	1 1/2" and 1 3/4" Hex.	1 3/4" Hex.
Rod Lengths	2' to 20'	2' to 20'	2' to 20'	2' to 20'	4' to 20'
Coupling Diameter	1 1/8"	1 1/4"	2 1/4"	2 1/2"	3 3/4"
Ring Seal Shank	1" Hex. Collared 1 1/4" Rd. Lugged	1 1/4" Rd. Lugged 1 1/2" Rd. Lugged	1 1/4" Rd. Lugged 1 1/2" Rd. Lugged	1 1/2" Round	2 1/2" Round



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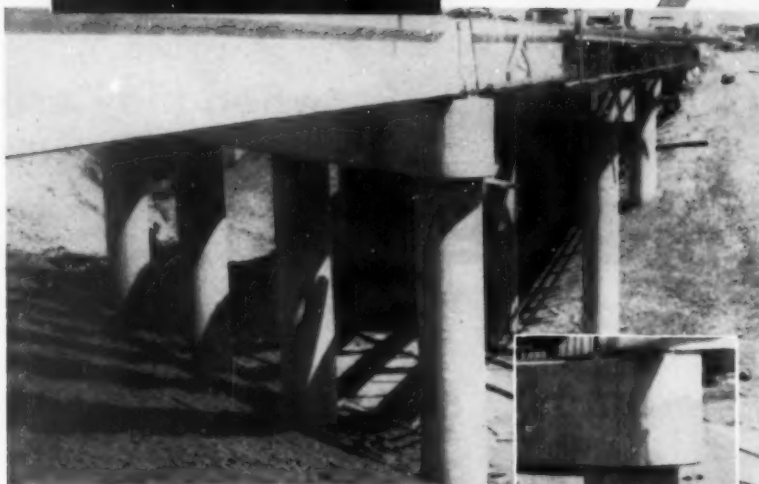


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Personals

J. L. Schneider Secretary of Portland Cement Association

The appointment of J. L. Schneider as secretary of the Portland Cement Association was announced by George E. Warren, chairman of the board of directors, following the Association's annual meeting November 11-13.

Mr. Schneider joined the Association in 1948 as editorial assistant in the Advertising and Publications Bureau, and became successively publications editor, assistant manager and manager. He served as manager of the publications bureau from 1954 until 1957. In May 1952 he was appointed assistant secretary.



J. L. Schneider

N. D. "DAN" TETERS was recently decorated by the government of France with the "Cross of The Legion of Honor" for his contribution to the security of NATO by his work as Construction Manager of Atlas Constructors which built the complex USAF bases in Morocco under Contract with the U. S. Corps of Engineers. Under his supervision, starting with the crash program at the outset of the Korean conflict, the bases and related installations were built in record time, one base being operational four months after ground was broken.

Mr. Teters is presently Resident Partner of Atlas Constructors, the

(Continued on page 32)



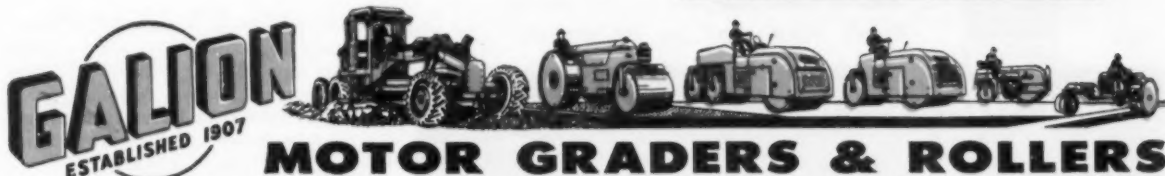
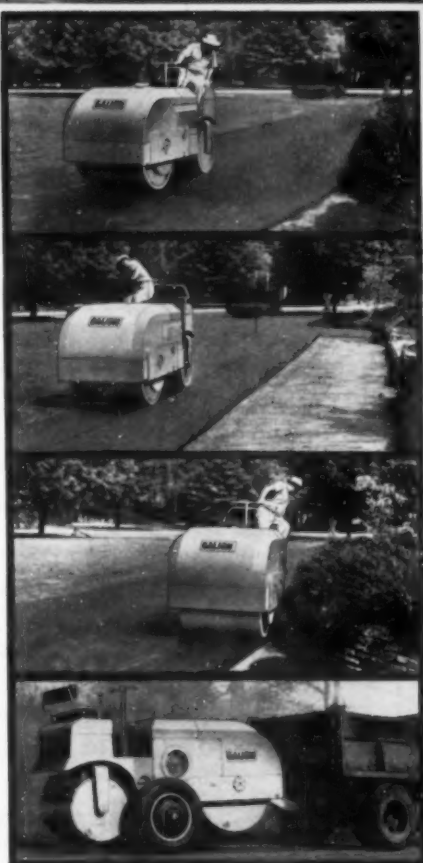
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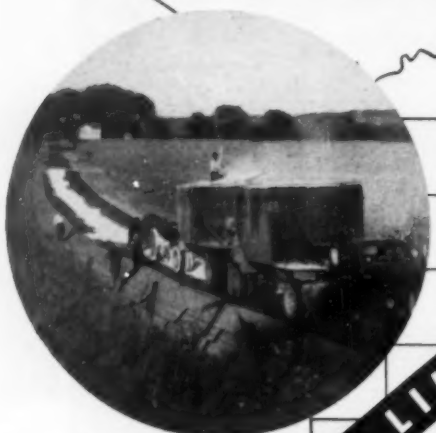
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ROADS AND STREETS, February, 1958

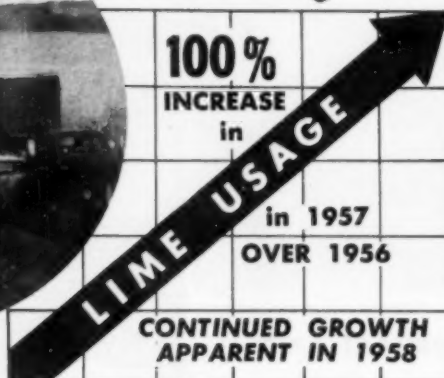
LIME STABILIZATION *On The March*

22 STATES HAVE USED HYDRATED LIME FOR STABILIZING SOILS IN BASES AND SUBBASES

Other states are planning early jobs,
presaging wide-spread national use . . .
At least 8 foreign countries have recently
employed lime stabilization.



Road construction in Ohio
with Lime Stabilization



WHY LIME STABILIZATION HAS GAINED IN POPULARITY

- ① Low cost—averages 35-40¢/sq. yd. per 6 in. of compacted depth.
- ② Permits use of submarginal base materials.
- ③ Provides flexibility in road construction . . . can be re-worked after rains or delays . . . resists rain like sand during construction.
- ④ Breaks down clay clods . . . increases workability of soils . . . cuts Pl.
- ⑤ Proven durability: 13 years experience of little or no maintenance on oldest roads.

**USED IN ALL CLASSES OF ROADS
FROM INTERSTATE FREEWAYS TO FARM-TO-MARKET ROADS**



RRS

**LIME STABILIZATION—
MORE THAN 2500 MILES CONSTRUCTED**

Write for further information and FREE booklet:

"LIME STABILIZATION OF ROADS"

NATIONAL LIME ASSOCIATION

925 15th STREET, N.W., WASHINGTON 5, D. C.

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Personals

(Continued from page 30)

Morrison-Knudsen sponsored co-venture of Bates & Rogers, Ralph E. Mills, Blythe Bros., and Nello Teer, as well as Vice President of Morrison-Knudsen International Company, Inc.



Dan Teters

T. C. POWERS, manager, Basic Research section, Portland Cement Association, Chicago, has received the Sanford E. Thompson award.

This is given by the ASTM, having been established by its committee C-9 on concrete and concrete aggregates, the award being for outstanding work in the field of the committee.

GEORGE T. McDONALD has announced his retirement as executive secretary of the State Highway Board, ending a 30-year career of service in the highway field.

He has accepted a position as director of the highway heavy construction division of the Associated General Contractors, Georgia branch, with offices in Atlanta.

MAX GERLACH, veteran Chicago excavating contractor, died recently at age 80. He headed the firm bearing his name, which helped build first Outer Drive in Chicago, the lake front breakwater, another municipal construction.

PHILLIPS 66 PRODUCT PERFORMANCE *plus*

Phillips 66 Individual Service can help
you make more money!



Get extra profit protection by using Phillips 66 heavy duty motor oils, greases and gear oils. They keep engines clean and protect your equipment against breakdowns that can cost you vital hours or days on a tight schedule. And with Phillips 66 Diesel Fuels your equipment has the power to put out its rated payload.

Complete individual service...

Phillips 66 individual service can make your operation more profitable, too. A Phillips 66 lubrication engineer will consult with you right on the job. He will make recommendations for the *right* fuels and lubricants, and he'll help you set up storage and service areas.



● Cut maintenance costs and down-time. Switch to Phillips 66 products now. Phillips 66 heavy duty motor oils, fuels, greases and gear oils meet manufacturers' specifications. For full details, write: Sales Department, Phillips Petroleum Company, Bartlesville, Oklahoma.



PHILLIPS 66 HEAVY DUTY MOTOR OILS

PHILLIPS PETROLEUM COMPANY, Bartlesville, Oklahoma

Sales Offices:

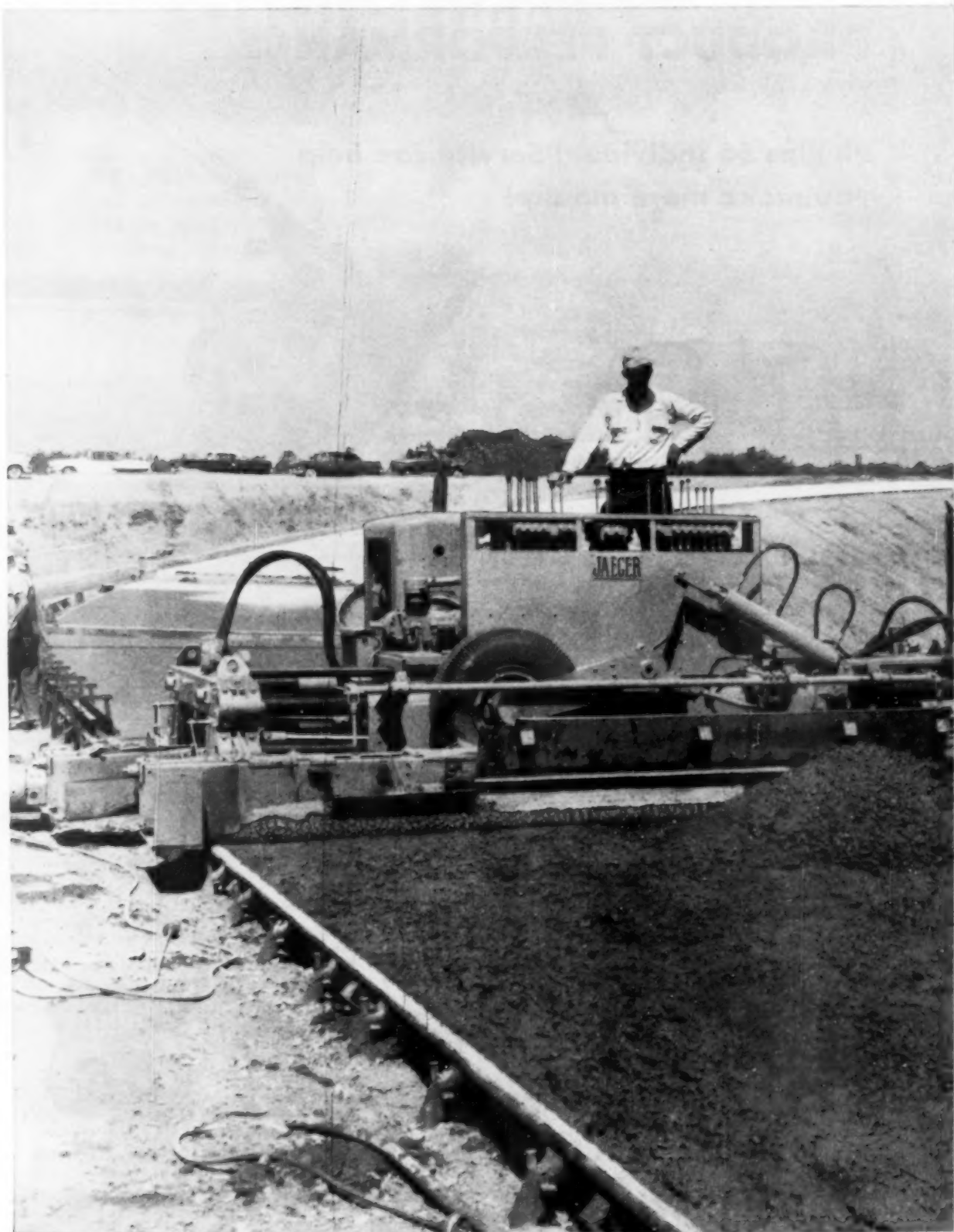
AMARILLO, TEX.—First Nat'l Bank Bldg.
ATLANTA, GA.—1428 West Peachtree St., N.W.
Station "C" P.O. Box 7313
CHICAGO, ILL.—7 South Dearborn St.
DENVER, COLO.—1375 Kearney St.
DES MOINES, IOWA—6th Floor, Hubbell Bldg.

HOUSTON, TEX.—6910 Fannin St.
INDIANAPOLIS, IND.—1112 N. Pennsylvania St.
KANSAS CITY, MO.—500 West 39th St.
MINNEAPOLIS, MINN.—212 Sixth St. South
OMAHA, NEB.—6th Floor, WOW Bldg.
RALEIGH, N. C.—401 Oberlin Road

SALT LAKE CITY, UTAH—68 South Main
ST. LOUIS, MO.—4251 Lindell Blvd.
SPOKANE, WASH.—521 East Sprague
TAMPA, FLA.—3737 Neptune Street
TULSA, OKLA.—1708 Utica Square
WICHITA, KAN.—501 KFH Bldg.

... for more details circle 304 on enclosed return postal card

ROADS AND STREETS, February, 1958



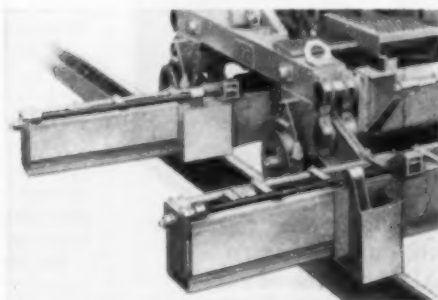
FINISHER ADJUSTED ITSELF TO SLAB WIDTHS VARYING FROM 12' TO 18' on this interchange, U.S. Routes 22 and 23 near Circleville, Ohio.

Fully available for 1958

the all-hydraulic, self-widening

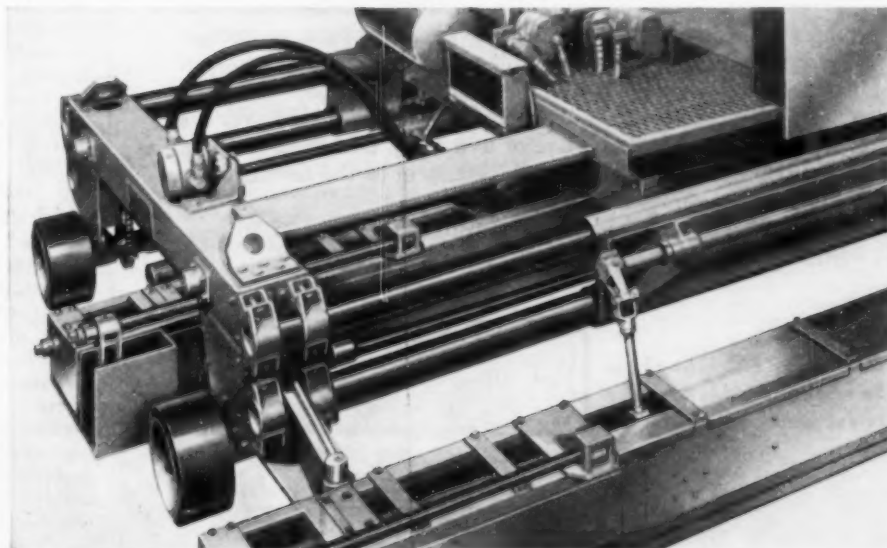
JAEGER "JX"

Accelerated winter production has enabled us to complete urgent back-orders on Type "JX" and "J" finishing machines. You can enjoy the advantages of this fast, flexible, precision-smooth finisher for your new slab work and get delivery, when wanted, by ordering now. See your Jaeger distributor, or write.



EVEN THE END SHOES ARE INFINITELY ADJUSTABLE

For variable width slab, Jaeger supplies 3' screed extensions on which the end shoes adjust in or out on a screw merely by turning a ratchet lever. Total 6' of infinite adjustability (3' at each end) is thus available to match the 6' hydraulic adjustability of the finisher frame. With additional 2' width adjustability by shifting wheels, standard 12'-18' Jaeger can lay 10'-18' width; 18'-24' model lays 16'-24'; 24'-30' model lays 22'-30'.



ALL-HYDRAULIC OPERATION gives you 6' of infinite width adjustability with the touch of a lever — a tremendous time-saving on today's variable width work. Also gives you smooth, hydraulic drive and finger-touch

control of traction, screeds, diagonal rear screed swing, tamper attachment and transportation wheels — all operations.

No mechanical transmissions. Gear-type hydraulic pumps power everything.

THE JAEGER MACHINE COMPANY • 223 Dublin Avenue, Columbus 16, Ohio

Jaeger Machine Co. of Canada, Ltd., St. Thomas, Ontario

CONCRETE SPREADERS • AGGREGATE SPREADERS • COMPRESSORS • PUMPS • MIXERS

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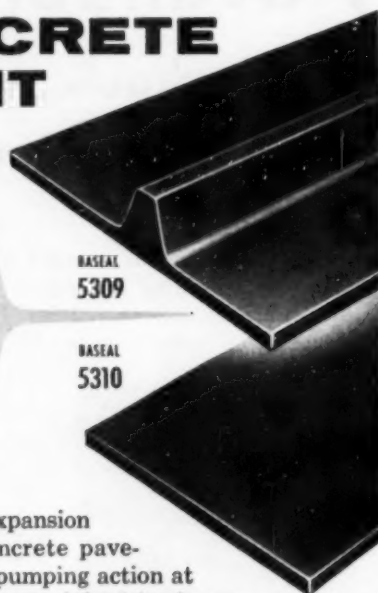
ROADS AND STREETS, February, 1958

SERVICISED

"BASEAL" rubber base plate

FOR CONCRETE PAVEMENT

**Keeps Water And
Foreign Materials
From Entering Joint
At Bottom...**



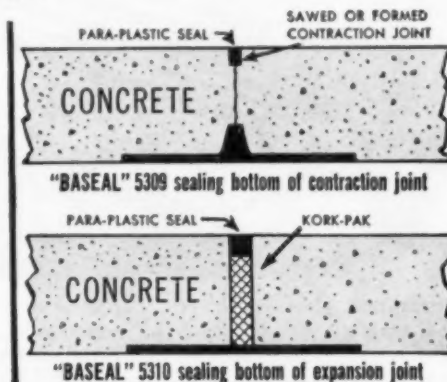
For maximum protection of expansion and contraction joints in concrete pavement, and the elimination of pumping action at joint intervals, be sure the *bottom* of the joint is protected against water seepage and the infiltration of foreign materials. Specify Servicised "BASEAL"—a resilient rubber base plate for expansion and contraction joints—made in two types, specifically designed for optimum performance and joint protection. "BASEAL" provides long-time protection because it is an extremely stable rubber compound, resistant to deterioration caused by fungus growth, etc.

Installation is simple. "BASEAL" is merely placed over the compacted pavement base prior to paving. Due to its resilient characteristics, the material will conform to the terrain after concrete is poured.

"BASEAL" is available in continuous lengths of 26 feet. Standard width is 6 inches.

*Drawings at right show
Servicised "BASEAL" in place
in expansion and contraction
joints.*

Write for the **SERVICISED**
Catalog which illustrates
and details Servicised
products for highway and
heavy construction work.



SERVICISED PRODUCTS
CORPORATION

6051 WEST 65th STREET • CHICAGO 38, ILLINOIS

... for more details circle 316 on enclosed return postal card

New Publications

Highway Economic Impact

"ECONOMIC IMPACT OF HIGHWAY TRANSPORTATION." Conference on this subject, published as Special Report No. 28 by the Highway Research Board, 2101 Constitution Ave., Washington, D.C. Price \$2.80 per copy.

This 88-page publication, sponsored by an HRB Committee, pertains to one of the new and important fields for highway research. This encompasses commercial, industrial and residential developments in both urban and rural areas; indeed, virtually all segments of the nation's activities.

Research findings in this field can be put to many uses. They can be helpful in connection with highway right-of-way acquisition, the conduct of public hearings, public relations activities in general, the determination of highway location and design, and other aspects of highway modernization.

In recognition of these circumstances, the American Association of State Highway Officials passed a resolution in November 1956, urging all state highway departments to undertake and foster economic impact research, and asked the Highway Research Board to sponsor a conference dealing with this matter. It is in pursuance of this request that the Board arranged this conference (March, 1957), which dealt with the non-vehicular aspects (land values, land use changes, bypass effects) of economic impact, rather than with the economic consequences of improving traffic operations.

Both short- and long-range objectives were explored at the conference. Both approaches are important from the standpoint of the highway official. The short-range studies will be of immediate assistance in connection with right-of-way acquisition and hearing activities. The long-range approach will yield more fundamental data upon which he can premise a long-range highway program of stable character, oriented to produce the best in highway transportation from many points of view.

The conference proceedings contain a condensed version of reports made by participants, together with summaries of the discussions. Acknowledgement is made to M. Earl

401 cu. in.
461 cu. in.
549 cu. in.
International

V8's

Read why fleet owners say:

"They're the hottest thing in our fleet!"

Enthusiastic owners of new INTERNATIONAL heavy-duty V-8 trucks have nothing but praise for these all-truck-built power plants. On-the-job performance has proven they are first-class profit-makers.

Road time is cut by maintaining higher sustained speeds with less shifting. Outstanding fuel economy and proper gearing result in more ton-miles

per gallon. Latest reports show these V-8's stay on the job longer, too.

See how these new truck-type V-8's are making out on jobs similar to your operation by looking over convincing owner reports at your INTERNATIONAL Dealer. While you are there, get behind the wheel and experience the greatest performance of any V-8 truck in the world.



Oil Pipe Hauler: "We haul 42,000 lbs. net payload of oil-field pipe over mountainous terrain. In the first 6 months of operation of our INTERNATIONAL V-8 truck we have had no engine expense, average 5 to 5½ miles per gallon of gas!"

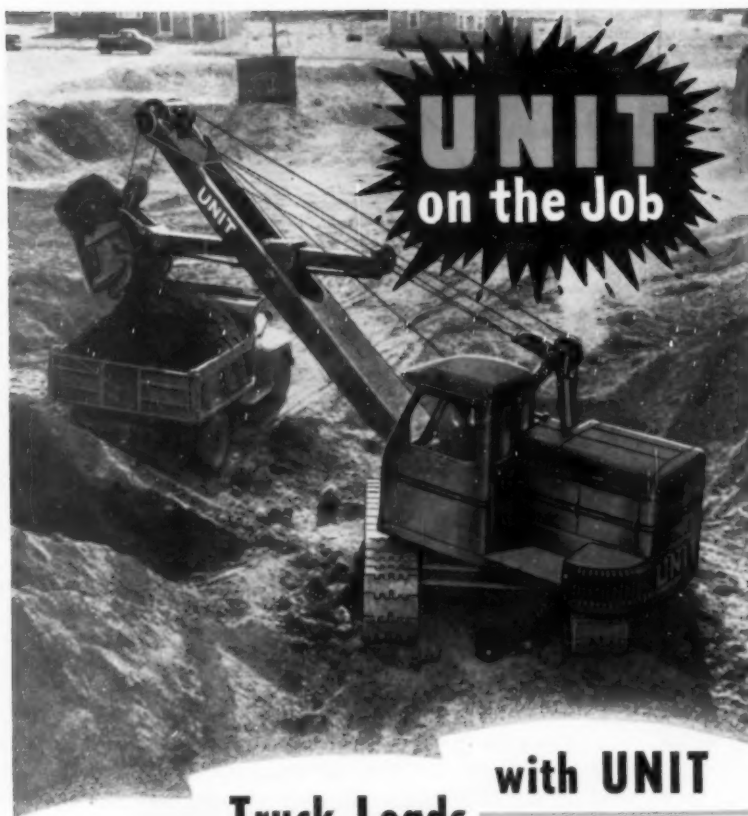


General Contractor: "My INTERNATIONAL V-8's have outperformed every competitive make under any and all conditions. We are most happy with the model VF-190A dump . . . I would recommend it to anyone using 8-10 yard dump trucks."



Steel Hauler: "We average 40,000 lbs. of steel per load. Trips range up to 125 miles with a lot of stop-and-start driving. With our INTERNATIONAL V-8 there's less shifting on hills, it holds speed better, makes better time, keeps up with traffic."

INTERNATIONAL TRUCKS cost least to own!



Step-up Truck Loads with UNIT

Here's a UNIT $\frac{3}{4}$ yard Shovel that's "in there swinging" . . . making big payloads. UNIT'S balanced stability and power permit hard digging . . . produce maximum yardage at low operating cost. Fewer working parts cut down replacements required . . . reduce maintenance costs. The FULL VISION CAB enables operator to see in ALL directions . . . promotes safety . . . increases efficiency. Results in more loads per day and easier load handling. Get the complete UNIT story. Write for literature.

UNIT CRANE & SHOVEL CORPORATION
6407 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.



**$\frac{1}{2}$ or $\frac{3}{4}$ YARD EXCAVATORS...CRANES UP TO 20 TONS CAPACITY
CRAWLER OR MOBILE MODELS . . . GASOLINE OR DIESEL**



All Models Convertible to ALL Attachments!

A 7312- $\frac{3}{8}$ -PC

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Campbell, engineer of economics, finance and administration, Highway Research Board, and to Edmond L. Kanwit, transportation economist, Bureau of Public Roads, for their reporting and summarizing of the conference material.

EFFECT OF DE-ICING CHLORIDES ON VEHICLES AND PAVEMENTS. Bulletin 150. Price \$0.75 remitted to Highway Research Board, 2101 Constitution Ave., Washington, D.C.

This bulletin contains three papers presented at the 35th Annual Meeting of the Highway Research Board, January 17-20, 1956.

The second paper, entitled "Effect of De-Icing Salts on the Corrosion of Automobiles," was presented by Ralph J. Wirshing, Head, Chemistry Department, Research Staff, General Motors Corporation. This report gives the result of a survey of corrosion of automobiles in a number of cities.

The third report, entitled "Curing Requirements for Scale Resistance of Concrete" was presented by Paul Klieger of the Portland Cement Association. Data are presented which indicate that non-air-entrained concrete is not resistant to scaling and that a minimum curing period is necessary before air-entrained concrete is resistant to scaling.

THEORY OF LAND LOCOMOTION: The Mechanics of Vehicle Mobility. By Lt. Col. M. G. Bekker (Canadian Army, retired) Technical Director, Land Locomotion Research Laboratory. Price \$12.50, University of Michigan Press, Ann Arbor, Michigan.

HIGHWAY NEEDS FOR CIVIL DEFENSE—a preliminary report. Prepared by the Bureau of Public Roads for the Federal Civil Defense Administration, price 25c. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C.

A PLANNED CONSTRUCTION PROGRAM FOR THE TENNESSEE STATE HIGHWAY SYSTEM. Prepared by the highway department with technical assistance by the Automotive Safety Foundation. Brochure available from the foundation at 200 Ring Building, Washington 6, D.C.

(Continued on page 42)

Time-light camera shows!

Which shovel-crane produces more?



"Conventional" controls

Follow the light lines. They show the "long reach" moves an operator makes with conventional controls to complete a hoe cycle, then shift from swing to travel, steer right and left and shift back from travel to swing. Such "arm's-length" work with slow mechanical or booster systems adds seconds to every move, drains operator strength, cuts end-of-the-shift output.



*Speed-o-Matic
power hydraulic controls*

No reaching, no yanking . . . just easy, "keyboard" operation with Speed-o-Matic controls and Independent-Swing-and-Travel when performing the same operations as the hoe with conventional controls. Short-throw levers speed cycles, up output, conserve operator strength. Ask the man who has worked both controls. He'll pick Speed-o-Matic every time!

Speed-o-Matic power hydraulic controls increase output by decreasing cycle time and reducing operator fatigue

Pushing a shovel-crane at its highest limit all shift long is easy with Speed-o-Matic power-hydraulic controls.

And Speed-o-Matic—standard on all Link-Belt Speeder shovel-cranes—is the original fingertip, flick-of-the-wrist system.

Hydraulic pressure assures the same fast, smooth response *all day*, without adjustments . . . and with perfect feel of the load at every lever position.

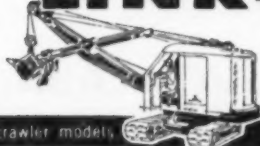
And Speed-o-Matic power-hydraulic controls are only one of the many Link-Belt Speeder advantages. Others include—

- GREATER USABLE HORSEPOWER
- FULL-FUNCTION DESIGN tailors the machine to the job . . . permits more standard and optional features such as Independent-Swing-and-Travel.
- BONUS CRANE CAPACITY when using long booms at extended radii.

For complete details on why your best shovel-crane investment is a Link-Belt Speeder, contact your distributor or write LINK-BELT SPEEDER CORP., Dept. RS-258, Cedar Rapids, Iowa, for book 2553.

14,790

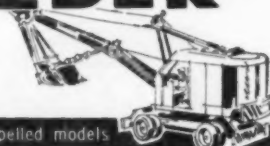
LINK-BELT SPEEDER



18 crawler models



6 truck cranes



4 self propelled models

It's time to compare . . . with a Link-Belt Speeder

. . . for more details circle 293 on enclosed return postal card

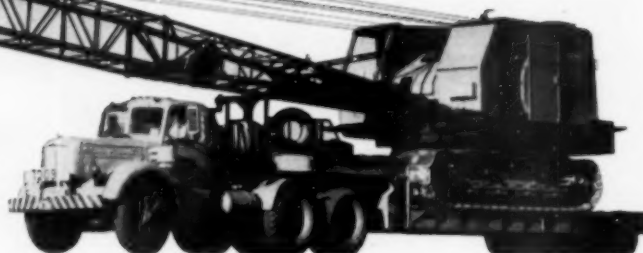
LOW BED



CAPACITIES
10 to 225
TONS

MODEL MT

35 to 75 ton standard models with higher capacities on special order. Eight dual wheels on four oscillating axles set in tandem on walking beams.



Whether you require standard models or specially-built trailers, you'll find Dorseys give you more service, more dependability, for your money.

Every trailer comes completely equipped with lights, brakes and other items needed

for highway use, and tires are full-sized for capacity loads.

The capacity ratings we quote are conservative, to give you an extra margin of safety when operating under unusual loads or adverse conditions. "Check the 'specs,' and you'll choose Dorseys!"



MODEL MK

Light weight and maneuverable, this low-cost model comes in 10 and 15 ton capacities, semi- and full trailers. 6 or 9-inch drop deck available.



MODEL RG — REMOVABLE GOOSENECK

with Dorsey's patented hydraulic system for efficient one-man front loading or unloading in 10 minutes. Capacities 15 to 75 tons.



MODEL MTS

Stub axles in tandem mounted on sturdy walking beams assure load stability in this model. Available with level or 6-inch drop neck as a semi- or full trailer in capacities 15 to 35 tons.

*Dorsey builds Heavy Duty Trailers of all types and sizes—
Ask for literature with complete details on any model you need!*



DORSEY TRAILERS / ELBA, ALABAMA

... for more details circle 261 on enclosed return postal card

what's it worth ... to be able to **FLUSH** dig?



DAVIS is the Only **BACKHOE** that can do this job!

Eliminate those long and costly hours of backbreaking hand labor associated with jobs that require flush digging alongside buildings, fences, hedges, and other obstructions!

Davis is the only backhoe that can do all these jobs ... and it does them quickly, easily, and profitably. In addition, Davis has a 200° continuous working arc.

You can operate Davis in places inaccessible to other machines ... or you can set up and be finished before other machines can maneuver into position. You can dump close to the hole for quick refilling, or wide of the hole for easy accessibility ... even direct-load into a truck.

Davis has unobstructed visibility so you can work fast and accurately in tight situations without having to "feel" your way around the job, nor depend upon shouts and hand signals for instructions. Both the big comfortable seat and finger-tip controls swing with the boom. You *always* face your work!

Advanced engineering and top quality construction? **Yes!**
but you will find them priced competitively low!

Davis Loaders and Backhoes are available for all popular models of International, Ford, Fordson Major, Ferguson, Case, Massey-Harris, Allis-Chalmers, Oliver, John Deere, Minneapolis-Moline, and Work Bull Tractors.

SOLD AND SERVICED EVERYWHERE BY BETTER DEALERS

For the name of your nearest dealers call Western Union by number and ask for Operator 25 ... or write direct. Please specify make of tractor.



MASSEY-FERGUSON INDUSTRIAL DIVISION
MASSEY-HARRIS-FERGUSON, INC.

... for more details circle 298 on enclosed return postal card



VERTICAL STABILIZERS—Individually controlled, non-slip stabilizer feet let you level-up and hold on slopes, tilt for bell holes. Vertical thrust eliminates excessive cylinder pressure. Note how operator revolves with the boom!

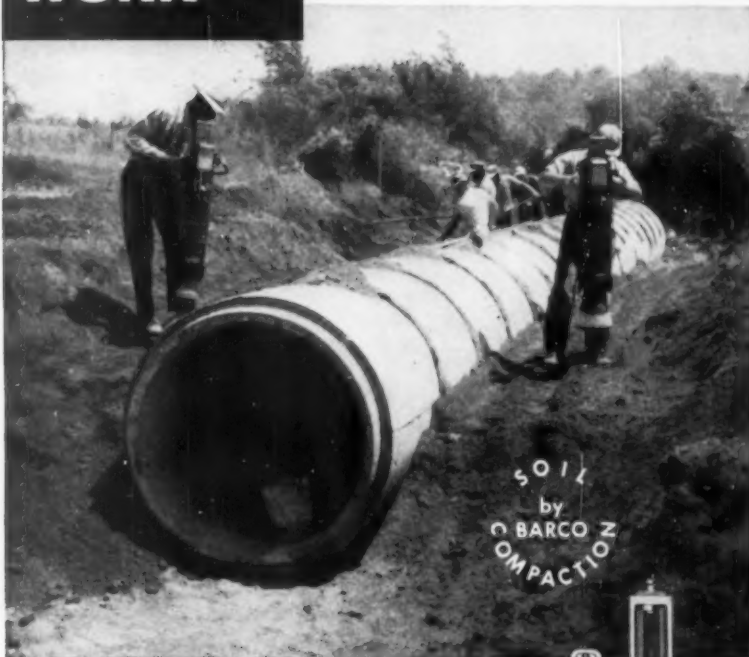


A Davis Loader and Backhoe combination will put money in your pocket by outperforming any other rig — pound for pound, dollar for dollar.

ON ROAD WORK—

Tamping fill around 4 ft. concrete pipe culvert on New York State Thruway Extension near West Seneca, N.Y. The Barco Rammers are owned by S. J. Groves & Sons Co., Syracuse, N.Y.

(Photo: CONSTRUCTIONER)



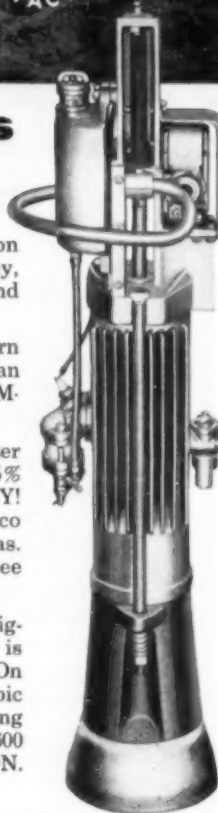
Barco Rammers are Essential!

CHECK THE RECORDS for soil compaction on every top ranking highway, toll road, thruway, or freeway built in recent years and you will find Barco Rammers!

The key to better construction—No modern trend has had a more phenomenal growth than the specification of HIGH DEGREE SOIL COMPACTION for all kinds of projects.

Easily meet rigid specifications—In test after test, Barco Rammers have delivered 95% to 97.5% compaction (modified Proctor Method)—EASILY! EFFICIENTLY! ECONOMICALLY! The Barco Rammer is especially useful in restricted areas. ONLY Barco can produce specified high degree compaction on lifts up to 20 inches.

Get jobs finished on time—One of the biggest advantages offered by Barco Rammers is ability to handle work in minimum time. On area tamping, one man can average 20 to 30 cubic yards of fill per hour. On trench backfill, using lifts up to 24", the rate for 18" trench is 360 to 600 feet per hour. ASK FOR A DEMONSTRATION.



BARCO MANUFACTURING CO.
515C Hough Street • Barrington, Illinois

BARCO RAMMER for High Degree Soil Compaction
BARCO VIBRA-TAMP for Granular Fill and Bituminous Surfacing

... for more details circle 246 on enclosed return postal card

New Publications

(Continued from page 38)

"THE SCIENCE OF ENGINEERING MATERIALS," edited by J. E. Goldman, published by John Wiley & Sons, 440 4th Avenue, New York 16, N. Y. 528 pages, \$12.00. Based on the proceedings of the Carnegie conference on the impact of solid state science on engineering education, held at Carnegie Institute of Technology in 1954, the new book reflects the accelerating trend toward applying tools of basic science to the solution of engineering problems.

Recent insights into the basic nature of atoms and atomic aggregates have brought into use revolutionary new materials and improvements in many of the standard materials. This book aims to give the engineer a feeling for these advances in materials technology and how they have come about.

Seventeen contributors set down the principles of solid state physics as they apply to the explanation of properties of materials. Why materials behave as they do is the motivating question here, with qualitative explanations and interpretations given of the behavior of a variety of materials. Not only such important materials as metals, alloys and semiconductors enter the discussion, but also cements, plastics and glasses.

Part II covers those intrinsic and mechanical properties of a given metal or alloy system which depend on deviations from perfect structure. The influences of dislocations on the ultimate strength characteristics of metallic materials are discussed in detail.

SECONDARY ROAD PROGRAM IN NORTH CAROLINA. By James S. Burch; presented at the 35th annual meeting, Highway Research Board. Presents data on expenditures of \$478 million in nine years on the state's secondary road system.

Facts given on the contemporary growth of factors which contribute to a "better way of life" based on North Carolina records. Such growth factors are reflected in data on agriculture, livestock, milk, poultry, rural telephones, motor vehicles, electricity, health, employment, education, level-of-living index, voting, library service, rural industry, etc.

Price, \$0.60. Address th Highway Research Board, 2101 Constitution Ave., Washington, D. C.

How prompt payments will help cut highway costs

When a contractor bids the big jobs coming up on the Interstate Highway program, he must take into consideration the cost of financing. This is true whether he has ample capital or whether he must borrow funds to finance his expenses. He must include in his bid present high interest rates on all his costs caused by deferred work payments. He must allow for this interest burden for all the months until completed work and authorized payments can catch up with his accumulated job costs. Not only does his problem of financing include the actual cost of producing the unit-pay items, but it also includes:

- Cost of pre-survey of job site, study of blue prints, job planning, estimating, and bidding.
- Cost of his performance bond, and all his job insurance policies.
- Cost of staffing for the job ahead.
- Cost of special equipment needed to fit job requirements.
- Cost of modernizing his equipment fleet to obtain lowest cost of work in place.
- Move-in costs including offices, shops and housing.
- Cost of job-supply inventory ... repair parts, fuel, oil, tires, as well as stockpiles of aggregates, cement, steel, etc.

- Initial make-ready work on haul roads, drainage, etc., prior to start of paid production.

- Financing cost of payroll and job supplies, not only prior to initial payments, but until current payments accumulate enough surplus to repay the initial job investment.

In many states, "hold-back" provisions intended to protect the government investment in contract payments have been built up and added to over the early years when we had smaller jobs and contractors with limited capital and small investment in equipment. The theory was to make "assurance doubly sure". As our jobs became larger, more highly mechanized, and required a tremendous increase in a contractor's initial expense and financial responsibility, these well intentioned, multiple safeguards have, in many states, been retained at an added cost in bid prices far beyond their need or worth to the contracting agency.

If every road-building department will give this problem careful study and consideration, we believe equitable and more liberal safe payment arrangements can be more widely applied. This will encourage more competitive bidding, lower costs, and faster completion of the gigantic road-building program ahead of us.

The contractor is "worthy of his hire" ... his money, too, is worthy of its wage.

1726-G-1

LeTourneau-Westinghouse Company
PEORIA, ILLINOIS
A Subsidiary of Westinghouse Air Brake Company

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ROADS AND STREETS, February, 1958

on the level...



or working upgrade!

here's why you get greater production with a REX® PAVER

Faster on the level, a Rex has the production edge on uphill paving as well.

Every time you work upgrade, you set your Rex for transfer and discharge times to suit—short, medium or long!

Going uphill, a quick, simple adjustment speeds up the cycle time of your Rex. With the gravity assist of transfer and discharge, you set the paver for short time—with fast transfer through two large transfer chutes. Immediately, there's a 7.3% production boost over a medium setting. (On work where you use the medium setting, you also have faster operation with a Rex!)

There you have it. Going uphill doesn't have to slow down your yardage—not when you're operating a Rex! Only Rex has this quick *adjustable* transfer and discharge cycle advantage. Another of the many reasons

why you'll be far ahead in batches and added profits per day with a Rex Hydrocycle Paver.

REX Hydrocycle Control has work-speeding advantages!

Amazing Hydrocycle literally "automates" the paver! Operator only sets batch meter and Hydrocycle's "hydraulic brain" takes over—controlling and operating the entire paving cycle. The human element is eliminated. There's no guesswork, *no guessing wrong—ever*. No wasted time. No operator fatigue—he stays alert and efficient, performing other functions better: traveling the bucket, swinging the boom, spreading the batch and moving the paver. Paving speed stays high all day long.

A Rex delivers the highest production—requires minimum of service.

See your Rex Distributor or write CHAIN Belt Company, 4652 W. Greenfield Ave., Milwaukee 1, Wis.



MOTO-MIXERS • BINS AND BATCHERS • BUILDING MIXERS • PUMPCRETE • RAILPORTER

CHAIN BELT COMPANY

PUMPS • PAVERS • SPREADERS • FINISHERS • FLOATS • CURING MACHINES • FORMS

"OUR EIMCO 105 'LOADER-CARRIER-CRANE-EXCAVATOR-DOZER' SURE SAVED TIME AND COSTS ON THIS JOB"

... Says Coast Contractors' President, Frank McHugh



TACOMA, WASH. - Debris loosened by flash floods clogged culvert drainage and 100 feet of county roadbed were washed out. Contracted to handle the "rush" repair job, COAST CONTRACTORS INC. moved their Eimco 105 Front-End Loader on the site. The

versatile Eimco cleared debris; dug and dozed its own access way to the bottom of the gully; trenched and graded a new culvert; transported and positioned 48" concrete piping, and (above) rebuilds the roadway.



NOW IT'S A CRANE! Coast Contractor's work crew comes up with a cable hitch attachment that converts the Eimco 105 into a crane for positioning pipe. NOTE: Loader's tough construction, high reach... operator visibility... tractor stability (with weight on slope side).

"Equipment has to be flexible to fit into our scheme... and our Eimco 105 has proven - IT FITS!"

The object of Frank McHugh's praise - an Eimco 105 Front-End Loader - "subbed" for many specialized machines in the speedy completion of a road repair job.

As president of Coast Contractors Inc., Frank's big problem is the same as that facing most every general contractor-builder: Getting a variety of odd jobs done fast without having profit "chewed up" by special equipment investments, labor and maintenance costs.

The Eimco 105 is a "hell-for-stout" earthmover with 40,000 lbs. breakout power to handle "tough"

jobs normally performed by specialized big equipment. Yet, it is faster and outmaneuvers tractors half its size.

Hydraulic boom and bucket cylinders respond quickly and simultaneously to lever control. The loader assembly is capable of 15,000 lb. lifts and 14 ft. discharge. Two final drives provide independent track reversal for quick, sharp turns or any operation requiring extreme maneuverability.

The Front-End Loader's overhead loading companion (Eimco 105 Excavator) provides discharge without turning plus these features.

Get the facts on both of these versatile machines before you buy!

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Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

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B 308

on the level...



or working upgrade!

here's why you get greater production with a REX® PAVER

Faster on the level, a Rex has the production edge on uphill paving as well.

Every time you work upgrade, you set your Rex for transfer and discharge times to suit—short, medium or long!

Going uphill, a quick, simple adjustment speeds up the cycle time of your Rex. With the gravity assist of transfer and discharge, you set the paver for short time—with fast transfer through two large transfer chutes. Immediately, there's a 7.3% production boost over a medium setting. (On work where you use the medium setting, you also have faster operation with a Rex!)

There you have it. Going uphill doesn't have to slow down your yardage—not when you're operating a Rex! Only Rex has this quick *adjustable* transfer and discharge cycle advantage. Another of the many reasons

why you'll be far ahead in batches and added profits per day with a Rex Hydrocycle Paver.

REX Hydrocycle Control has work-speeding advantages!

Amazing Hydrocycle literally "automates" the paver! Operator only sets batch meter and Hydrocycle's "hydraulic brain" takes over—controlling and operating the entire paving cycle. The human element is eliminated. There's no guesswork, *no guessing wrong—ever*. No wasted time. No operator fatigue—he stays alert and efficient, performing other functions better: traveling the bucket, swinging the boom, spreading the batch and moving the paver. Paving speed stays high all day long.

A Rex delivers the highest production—requires minimum of service.

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"OUR EIMCO 105 'LOADER-CARRIER-CRANE-EXCAVATOR-DOZER' SURE SAVED TIME AND COSTS ON THIS JOB"

... Says Coast Contractors' President, Frank McHugh



TACOMA, WASH. - Debris loosened by flash floods clogged culvert drainage and 100 feet of county roadbed were washed out. Contracted to handle the "rush" repair job, COAST CONTRACTORS INC. moved their Eimco 105 Front-End Loader on the site. The

versatile Eimco cleared debris; dug and dozed its own access way to the bottom of the gully; trrenched and graded a new culvert; transported and positioned 48" concrete piping, and (above) rebuilds the roadway.



NOW IT'S A CRANE! Coast Contractor's work crew comes up with a cable hitch attachment that converts the Eimco 105 into a crane for positioning pipe. NOTE: Loader's tough construction, high reach... operator visibility... tractor stability (with weight on slope side).

"Equipment has to be flexible to fit into our scheme... and our Eimco 105 has proven - IT FITS!"

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The Front-End Loader's overhead loading companion (Eimco 105 Excavator) provides discharge without turning plus these features.

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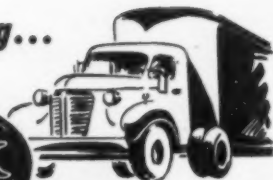
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Keep 'Em Flying...



**Keep 'Em Rolling...
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FRINK



**ROLL-OVER
SNO-PLOW**



**Rotates from Left to Right Hand
Plowing Position IN 15 SECONDS**



On runways and thruways, modern time tables depend on fast, efficient snow removal. The Frink Roll-Over Sno-Plow fills this need . . . works full plowing time because it can be reversed from left to right position in 15 seconds! No deadheading! Hydraulic controls in the cab quickly reverse the plow to throw all the snow in the direction dictated by the wind and disposal area location. On dual highways, the Roll-Over can discharge left, yet travel with the traffic.

This unique plow, with curved, tapered mold-board, operates safely at high speed . . . throws and spreads snow to eliminate high banks and subsequent drifting. And when the job is done, quickly and economically, the Roll-Over parks upright within its truck's width. For full details, write to Frink for catalog.

Other dependable Frink Sno-Plows (V-Type, One-Way and Reversible) can all be attached to the Roll-Over's lifting device assembly.

**For Snow Plow Know-How
It Pays to Think of**

**FRINK
SNO-PLOWS**

Clayton, 1000 Islands, N. Y.

Frink Sno-Plows of Canada, Ltd., Toronto, Ontario

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Deflection of Prestressed Concrete Beams

By C. A. Straubel and A. M. Ozell. *Journal of Prestressed Concrete Institute* (425 N. E. 5th St., Boca Raton, Fla.), Vol. 1, No. 4, pp. 5-26, March 1957. *Highway Research Abstracts*, October 1957.

There are several factors which influence the modulus of elasticity of concrete, the properties and size of aggregates, type of cement, the curing method, and the definition of modulus of elasticity itself, whether tangent initial or secant modulus. The modulus may vary also with the speed of load application and with the type of specimen, whether a beam or a cylinder. With all these variables it is almost impossible to predict accurately the value of the modulus for a given concrete.

For low strength concrete, as employed in conventional reinforced concrete construction, it was found convenient to use empirical formulas to determine the value of the modulus of elasticity as a function of the ultimate strength. The results were reliable for low strength concrete, but for high strength concrete they were not at all in agreement with the actual behavior.

In general, test data on prestressed concrete beams indicate that the values of the modulus of elasticity determined from measured deflections are higher than those determined from measured strains. This observation gives rise to many questions. What, if any, is the relationship between the "deflection modulus" and the "strain modulus?" Can these moduli be related to the cylinder strength of the concrete? What is the relationship between the ultimate strength of concrete in compression and in flexure?

The purpose of this study was to define more accurately the behavior of prestressed concrete in the so-called elastic range, or before cracking. A series of beams of various lengths, cross-sections, and prestress were tested and strain distribution and load-deflection measurements were taken. Test data on prestressed concrete published by other investigators were also collected. From this data a comparison was made with the theoretical approach, and the various assumptions checked for accuracy.

New 23-Mile Route Planned in Connecticut

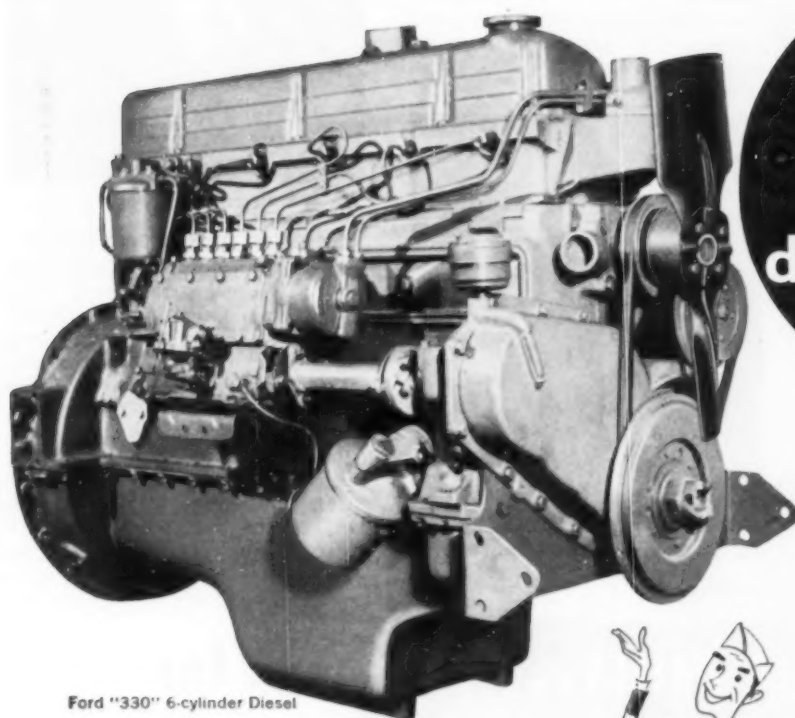
Not all of the brand new highway location is to be done on the interstate system. In the east where in the post-war years most state highway construction effort has been in improving existing routes, news is now being made by such decision as that of the Connecticut state highway department.

The Connecticut engineers have announced a five-year program to reconstruct a new Route 7 link extending 23 miles north from Norwalk to Danbury. This location would replace the present obsolete highway.

According to a news report, David Johnson, planning engineer for the department, said that the construction would not start for 5 years, but that preliminary surveys are being undertaken. He has asked each town along the route to submit its particular "sacred cow" so that essential buildings can be by-passed if possible in determining the final location.

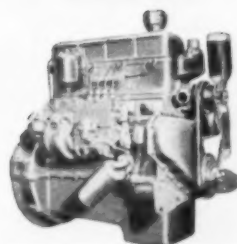
The new highway will be a landscaped, divided, 4-lane expressway, constructed with 50 per cent federal aid as an interstate project.

NOW, Another modern diesel from **FORD-**



Ford "330" 6-cylinder Diesel

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cubic inch
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For dependable, heavy-duty service, you'll find the new Ford "330" Diesel hard to beat.

Clean and simple in design, the Ford Heavy Duty "330" is quality-built throughout for quick all-weather starting, dependable performance and top operating economy.

Included among its many advanced features are: removable "wet" cylinder sleeves that eliminate costly reboring; precision-made Four-Way Injectors giving higher combustion efficiency, greater economy; and rotating exhaust valves for better seating, longer life.

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ENGINE SPECIFICATIONS		"220"	"330"
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Bore and Stroke—Inches		3.94 x 4.52	3.94 x 4.52
Displacement—Cubic Inches		220	330
Brake Horsepower	Dynamometer	61 @ 2250	96 @ 2250
	Continuous	49 @ 2250	77 @ 2250
Torque	Dynamometer	152#' @ 1600	236#' @ 1500
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YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED!

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ROADS AND STREETS, February, 1958

Connolly, Donaldson Honored By Annual Moles' Awards

Peter F. Connolly of Osterville, Mass., and Francis Donaldson of Bronxville, N. Y., have been named 1958 recipients of the annual Moles' awards for "outstanding achievement in construction," considered the highest recognition given in the American construction industry. The honors will be formally presented at the annual awards dinner, on January 29 at the Waldorf Astoria in New York. The Moles is an association of leading figures in the tunneling and heavy-construction industry.

Mr. Connolly is president of the Peter F. Connolly Co., and has been primarily concerned with tunnels and pneumatic caissons. His career started in 1902 on the East Boston tunnel and has included important tunnels for the New York City Board of Water Supply. He built water works in Cleveland and Akron, Ohio in the 1916-24 period and during World War II was project manager for the joint-venture building of the Trinidad Third Air Base for the U. S. Navy.

Mr. Donaldson has been vice president and director of Mason & Hanger, New York construction firm, since 1936. He designed the braced open cofferdams that solved difficult problems in the foundations of the New Jersey towers for the George Washington Bridge and has played a prominent role in the construction of the Lincoln tunnel, the Brooklyn-Battery tunnel, and the Ray's Hill tunnel on the Pennsylvania Turnpike.



Francis Donaldson



Peter F. Connolly

Study Plan for Ontario Roads

A plan for Ontario highways has been developed as the result of an engineering analysis of need on the King's highways and secondary roads of that Canadian province.

The province's highway problem, financing details, a basic proposed plan, program costs and other details have been presented in a formal report by the Automotive Safety Foundation of Washington, D.C., which was commissioned to make the study.

McCARTHY AUGER DRILLS...

....for

EVERY PURPOSE

Heavy-Duty Vertical auger drill gives you more profit per job by drilling from 3 to 24 in. diameter holes 400-800 ft. per day.

Trench-type auger drill speeds pipeline work by drilling under roads, RH beds; readily equipped with pipe-pusher.



These two McCarthy Auger Drills speed work and cut costs in a variety of contracting jobs—blast hole, foundation and deep post hole drilling, dewatering, exploration; and underground pipeline installation. Bid lower, work faster and profit more with these two great McCarthy Auger Drills. Contact your nearest representative or write direct for Bulletin M-100 (vertical) and Bulletin M-107 (trench-type).

Distributor—Rish Equipment Company, Bluefield, W. Va.

Manufacturer of Drilling

Equipment Since 1901

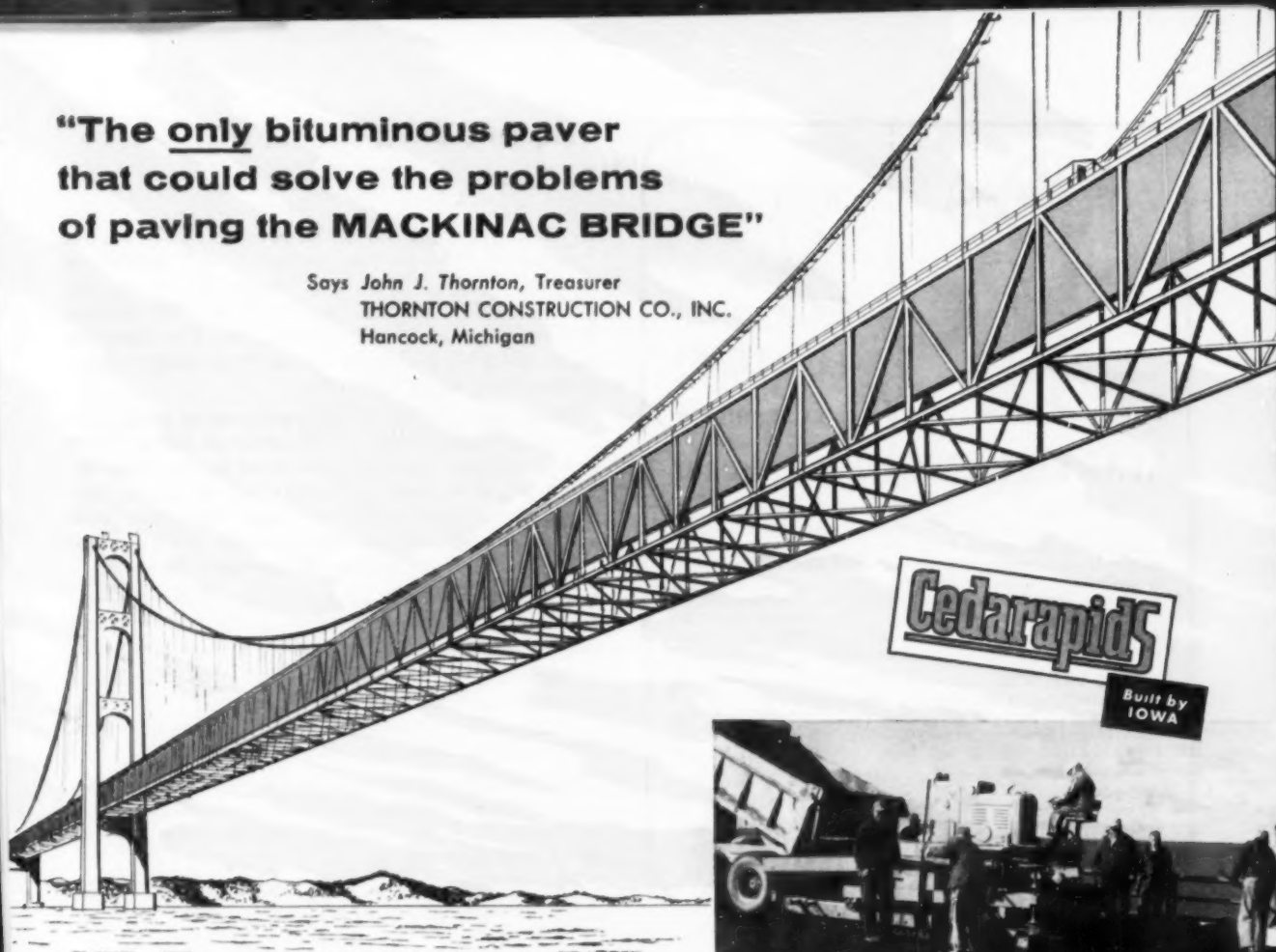
THE SALEM TOOL CO.

808 S. ELLSWORTH AVE. • SALEM, OHIO, U. S. A.

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"The only bituminous paver that could solve the problems of paving the MACKINAC BRIDGE"

Says John J. Thornton, Treasurer
THORNTON CONSTRUCTION CO., INC.
Hancock, Michigan



Paving around scuppers, rail-
ing posts and expansion joints
was a difficult problem on the
Mackinac Bridge roadbed pav-
ing job, according to Thornton
Construction Co., one of the

leading contractors in Michigan and surrounding areas.

The 80 expansion joints used in the structure had lips extending 1 1/2" above the concrete floor, which had to be flush with the finished bituminous surface mat. This problem was solved by Thornton's Cedarapids Bituminous Paver, which laid a smooth, even surface up to and away from these joints without excessive hand labor.

Says John Thornton, "We are very well sold on this machine as being the only machine that could have done this job. The roller path is very ingenious and was very helpful in our successful completion of this project."

Here is another instance where the "new concept of bituminous paving", exemplified by the exclusive features of the Cedarapids Paver, saved time and money for the contractor.

Write for complete information, or ask your Cedarapids Dealer about the profit-advantages of a Cedarapids Bituminous Paver on your next job.



(Above)—Note the expansion joint jutting from the concrete bridge floor in the foreground. Then note the smooth, even bituminous surface on either side of the joint in the paved lane.

(Below)—The exclusive Cedarapids oscillating rollers permit the crawler tracks to pass over the 1 1/2" lips of the expansion joints and still keep the paving screed on a level plane.



IOWA

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Cedar Rapids, Iowa, U. S. A.

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TRANSIT
MODEL 7-F
\$720.00



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IN A
LIFETIME!**
you acquire a

WARREN-KNIGHT Instrument

Practically eliminated during an entire lifetime of service are repairs and maintenance to a Warren-Knight Transit. The design and construction of these superb instruments is so superior and so different that it is prudent to investigate them, if you are in the market. After all, an instrument that promises probable total elimination of repairs and maintenance — and will probably never be replaced during your entire remaining professional career — certainly offers you a dramatic saving.

FREE 10 DAY TRIAL — So sure are we of your reception to this magnificent instrument that we offer it **FREE** for 10 days trial test on your own work sites. You will find that over 40 superior advantages will save you time and effort. Prove for yourself the full facts concerning this unique instrument.

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WARREN-KNIGHT
136 N. 12th St., Phila. 7, Pa.



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Torqmatic Drives Gain in Use By Trucks and Earthmovers

By H. C. Kirtland and R. M. Schaefer, SAE Journal (Society of Automotive Engineers, 485 Lexington Ave., New York 17, N. Y.), Vol. 65, No. 1, p. 112, January 1957. (Presented at SAE Central Illinois Earthmoving Conference, Peoria, Ill. The complete paper available from SAE Special Publications Dept., at above address; price \$0.60.)

More and more trucks and earthmoving equipment are being supplied with torque-converter drives. Manufacturers have initiated this trend by building the transmission to meet the specialized needs of these equipment. Three types of torque converters, each with specifically different characteristics, are now available to meet the following diverse applications:

1. For tractors, loaders and rubber-tired prime movers: equal number of speeds forward and reverse, ratio steps of about 2:1 with three speeds and sensitive shift.
2. For dump trucks, scrapers, and off-highway vehicles: 4 speeds forward and 1 or 2 reverse, ratio steps that produce a 1-2-4-6 progressive set-up, optional lock-up clutch and optional hydraulic retarder.
3. For highway trucks: 6 speeds forward and 1 reverse, ratio steps approximately 1:4:1 (6:1 over-all coverage), automatic controls, automatic lock-up clutch and optional hydraulic retarder.

(The complete paper available from SAE Special Publications Dept., at above address; price \$0.60.)

Ferguson

3 to 5 TON PORTABLE TANDEM ROLLER

**COMBINATION CONSTRUCTION
AND MAINTENANCE
ROLLER**

Air or water cooled
engine. Wheels
hydraulically controlled.
Hydraulic steering.
Two-speed transmission.
Furnished also as tandem.



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ROLLERS FOR EVERY PURPOSE

SHOVEL SUPPLY COMPANY

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BIG PROJECTS PROVE IT!

Firestones are carrying more loads per dollar!

From the St. Lawrence Seaway to the Priest Rapids Dam in the State of Washington, records prove that Firestone Rock Grip Tires with S/F—safety-fortified—Nylon outwork and outwear them all. Tough cord bodies withstand severest punishment to slash downtime losses. You cut tire costs because two great tread designs match these off-the-highway tires to *any* job. You get the *flotation and traction* you need in loose earth and wet going. You get *armored protection* for hauls over splintered shale and knife-edged rocks. Firestone Tires defy cuts and slugging impacts like no other tires made. Ask your Firestone Sales Engineer about these *tubed or tubeless heavy-duty* tires. Call him today at your local Firestone Dealer or Store.



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ROCK GRIP

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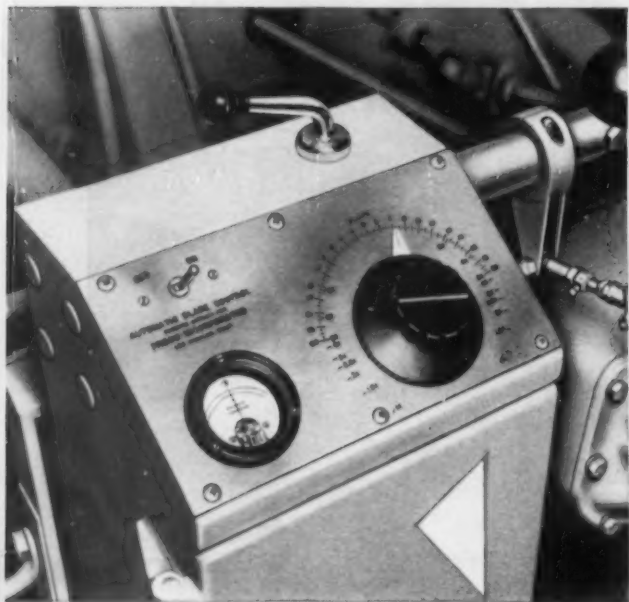
BETTER RUBBER FROM START TO FINISH

... for more details circle 269 on enclosed return postal card
ROADS AND STREETS, February, 1958

JOB REPORT FROM NEVADA ON

AUTOMATIC BLADE CONTROL

-AVAILABLE ONLY FOR CAT MOTOR GRADERS!



JUST DIAL THE SLOPE ON THIS
PRECO AUTOMATIC BLADE CONTROL...



...IT CONTROLS BLADE SLOPE WITHIN
 $\frac{1}{8}$ " IN 10', REGARDLESS OF TERRAIN!

From job after job, reports are coming in about the performance of the Preco Automatic Blade Control, a major feature introduced last year for exclusive use on Cat Motor Graders. How's it doing? Here's a typical answer from Superintendent Bill Hanson of Isbell Constr. Co., Inc., of Reno: "Work on finish is easier with the automatic control and is very accurate." His remarks are the result of work on a 9-mile, 4-lane freeway project near Carson City, Nevada. As for accuracy, controlling blade slope *within* $\frac{1}{8}$ " in 10' can be done!

More improvements for the No. 12

Though the No. 12 has earned the reputation of "standard of the industry," Caterpillar constantly looks for and finds ways to improve this machine. Automatic blade control is an example. Here are some other, even more recent improvements:

Longer main frame—a $4\frac{3}{4}$ " longer main frame adds extra clearance between toe of blade and front tire for all blade positions.

Better visibility—31% more glass area in cab increases operator's visibility and efficiency.

Increased operator comfort—new seat adjusts fore and aft. Back rest adjustable, too. Cab 6" higher and cab roof insulated to reduce noise level.

Increased versatility—4" longer tandem provides plenty of clearance for chains even when machine is equipped with large 14.00-24 tires.

Have you seen the improved No. 12?

Because of these and other new features, you can count on the No. 12 for even better work—and faster. Look it over at your Caterpillar Dealer. Better still, look it over in action. Have him demonstrate a No. 12 equipped with automatic blade control. See for yourself how it steps up production!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

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FOR HIGH PRODUCTION,
EQUIP YOUR CAT MOTOR GRADERS
WITH AUTOMATIC BLADE CONTROL

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Shelf Road

Small Outfit Had to Do It

By H. K. Glidden

Contributing Editor, Roads and Streets

WHY IT OFTEN COSTS MORE THESE DAYS to reconstruct a mountain-canyon tourist highway, is well illustrated by experience on a current Wyoming project. This job is the 4.05-mile segment of U.S. 26 (and 89) between Jackson and Alpine, in western Wyoming. The problems and methods should interest both the engineer and the contractor.

This highway route leading to the Jackson Hole country carries a very heavy vacation traffic with a high count of camping and boat trailers. Since no local detour was possible along the Snake River Canyon, the reconstruction to higher standards had to be planned for accomplishment in the midst of this traffic—the tourist and work season practically coinciding.

Realizing that this National Forest Highway job

would not be a cheap one, engineers of the U.S. Bureau of Public Roads allocated a substantial sum for it. Bids early in 1957 exceeded estimates so far that the 52 cents originally set for excavation was "thrown out the window" and the job was enlarged and re-advertised.

From bidders it was learned that a good deal of the excess cost was occasioned by the inadequate provision for control of traffic during the contractor's working hours. In re-advertising the job, a provision was added giving the contractor the right to close the highway to traffic during specified hours of the day. Even with this provision, the project cost was increased an estimated \$100,000 as a penalty for not being able to detour traffic around this area during the job construction.

● "Shelf" is the word. Note existing road below. Gardner-Denver Air Trac is drilling inclined holes along face of rock cut.

One-way traffic in summer, intermittent closing several times daily after September 1st, was pattern on relocation of Wyoming U. S. 26.

Compact equipment fleet selected for working under restricted conditions.

**ONE OF A SERIES ON
ROCK EXCAVATION**





- Traffic was stopped periodically to allow motor grader and water truck to remove loose rock and lay the dust resulting from benching work "upstairs." This Ingersoll-Rand Gyro-Flo 600 compressor was once completely covered by rock slide but suffered no damage other than exterior disfiguration.

Finally on April 7, 1957, the job was awarded to Eagle Construction Co., of Boise, Idaho. The \$770,000

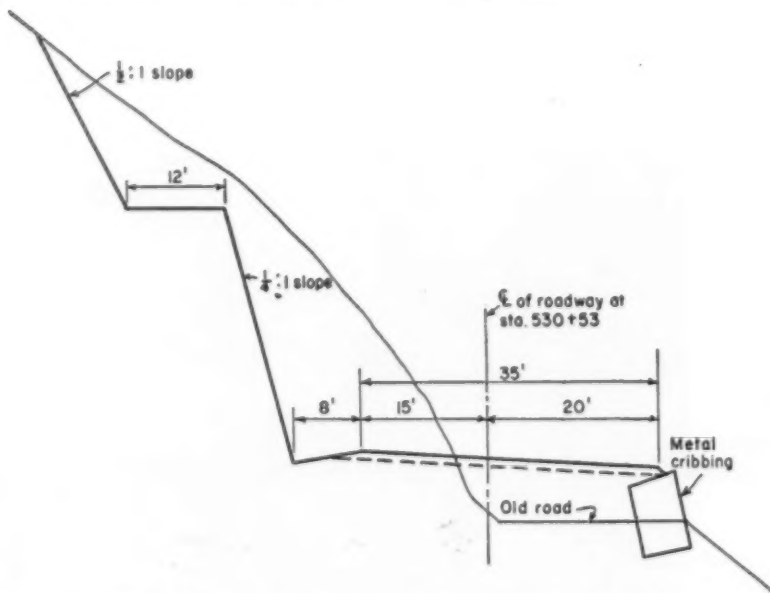
allocated for the work by the Bureau included 12 percent for engineering. Contract time was 300

days. Chief bit items were as here tabulated. The excavation (largely rock) was bid at 81 cents.

- *Traffic-Handling Policy.* The contractor in the early stage was able to get the job going without serious traffic restrictions. But because the new alignment either crossed over or coincided with the existing road at numerous points, or endangered traffic from rock falls, a definite traffic handling policy was agreed on. From June 1 to September 1, 1957, traffic was restricted only to the extent that the contractor had to maintain one-way traffic.

The contractor arranged his work schedule to coincide with the periods of least tourist traffic. During the summer, work hours were usually from 4 a.m. to 2:30 p.m. Another schedule, used when required, was from 10 p.m. to 8 a.m.

From September 1 through the present winter, the road was closed to all traffic when necessary during five different periods each day. Travelers were advised of the schedule for closing of the road by advertisements in appropriate papers. Also signs were posted at strategic locations, so as to prevent traveler



- Cross-section of the new road showing the prevailing mountainside shelf and the technique of enveloping the old roadway with the new. This scheme permitted traffic handling, first on the existing road, then on the new grade.

from proceeding a long distance on this highway and then finding that he could not get through.

• **Equipment.** From a construction standpoint, this project has been an excellent example of how a contractor can adapt his work to unusual circumstances, through the utilization of proper construction equipment. Some of the accompanying photographs illustrate the ledge location with its precipitous drop into the Snake River far below. In all instances, turning space was extremely limited. There was literally no place to park equipment, which made it necessary to utilize a minimum number of machines.

For example, in particularly limited space, two Tournarockers Model E-9 were loaded with a Link-Belt Speeder 1¼-yd. shovel, and with a Cat D6 dozer assisting. The Tournarockers with their electric steering held their own in the one-way traffic and on the steep side slopes.

For high-speed operation in areas where the cuts and hills were more readily accessible, Euclid S-18 scrapers were employed, with Cat D8 and D9 dozers and pushers.

The unclassified excavation contained a high percentage of rock which had to be drilled and blasted. Again using minimum equipment, a single crawler-mounted Gardner-Denver Air Trac performed most of the blast hole drilling, and acted as a towing unit for an Ingersoll-Rand 600 Gyro-Flo compressor up and down the rugged slide slopes.

(This compressor was buried in a rock slide early in the job, taking seven hours to dig out. No damage to working parts, although the exterior was badly beaten up.)



• Link-Belt Speeder shovel with Esco 7896 1¼-yd. bucket loading LeT-Wesco Tournarockers at edge of talus slide.

Holes to a depth of 20 to 25 ft. were drilled with 2½-in. Timken tungsten carbide insert rock bits (sent to Boise for sharpening). Drill holes were sloped about ½ to 1 in many instances to coincide with the design slope of the cut face, the operator using a plumb bob and offset rule.

• **Blasting technique** varied greatly to conform to the situation encountered. Wherever it was found that one row of holes would tend to

throw the rock back against the side slope, deckloading was resorted to. Deckloading was accomplished by starting the loading from the bottom using about one-third of the total explosives required for the hole. A 3 ft. depth of sand was then tamped above this charge. The next charge was placed above the sand. This was repeated until the explosives reached a height of about 8 ft. below the top of the rock. In deckloading a separate primer was

• Foreman of this crew commented: "As soon as you had built one Armco metal cribbing slope protector, you can consider yourself an expert. The rest of them won't give you any trouble."





● Thor Model 6106 air tamper and Ingersoll-Rand 125 Gyro-Flo compressor were used for compacting around Republic corrugated metal pipe. Hough Payloader used for excavation and backfill.

used for each lift.

Down holes were loaded with Illinois Powder Company's Gomex and 65 percent bag packaged dynamite. Gold Medal 40 percent gelatin was used as a primer. Twenty percent of Gomex was mixed with 80 percent of either bag packed dynamite or gelatin.

Sometimes it was impractical to get drill equipment up on top of the side slope. In these instances lifter shots were resorted to. These were drilled horizontally into the rock at about finish grade elevation. Stick cartridges 2"x8" were used in the down holes, and 2"x16" sticks in the lifter holes for faster loading. Single row holes and lifter holes were fired by using Primacord in place of blasting caps.

In some of the rock cuts it was possible to get as many as six rows of holes on 5 ft. centers. In this case millisecond delay blasting caps were used as it was found that this method did the best job of kicking



● Tournarocker E9 and Cat D6 dozer proved a maneuverable combination for widening fill above the Snake River.

Principal Bid Items, U.S. 26 Wyoming Project

Unclassified excavation	420,000 cu. yd. @	\$0.81
Class A concrete	425 cu. yd. @	79.00
Aggregate base course	15,400 cu. yd. @	1.50
6" corrugated metal perforated pipe	3,000 lin. ft. @	5.00
(Fencing) Metal Cribbing design A	4,600 sq. ft. @	7.50
Deep beam guardrail	1,850 lin. ft. @	4.00
MC cut-back Grade B-1	85,000 gal. @	0.19
RC cut-back grade 0, 1, 2 or 3	10,000 gal. @	0.20
Metal cribbing design B	320 sq. ft. @	8.00
Metal cribbing design C	380 sq. ft. @	8.75
Metal cribbing design D	860 sq. ft. @	10.25

4 installations of Design A cribbing

1 installation of Design A, B, C and D cribbing

the rock out away from the slope.

In commenting on blasting practices, superintendent Orville Denney advised he had gotten a great deal of satisfaction out of the use of Primacord as he found it cheaper and quicker to wire in; and it gave the men a feeling of safety, in that Primacord is difficult to detonate as compared with blasting caps. Another point brought out by Denney was that it was necessary to use stick material in the wet holes, as bag powder did not prove successful where water was encountered.

Due to the high percentage of rock in the excavation, no rolling of fills was necessary except in topping out. Rock fill was brought up to within 5 in. of the finish grade then topped out with selected borrow and compacted to high density.

The 4-in. thick base course consisted of $\frac{3}{4}$ in. minus crushed gravel. A road-mix surface will be placed in the summer of 1958. Eagle Construction Co. brought in a Universal roll and jaw portable crusher for his aggregates.

Armco metal cribbing was installed at several locations to hold some of fills. The contractor used a clamshell bucket to dig out the areas involved. As soon as the cribbing was installed the area in and around the cribbing was carefully compacted with hand tampers.

● *General Notes.* The new roadway of 30 ft. width has 6 degree maximum spiraled curves and is designed for safe handling of traffic at 50 mph. The job is part of a progressive modernization of the route

(Continued on page 138)

Are Old Mountain Roads the Safest?

In discussing the possible safety value of the new U.S. 26 location, Buford Irion, project engineer, raised a question of wide interest. Will the new road have a lower accident rate—or higher? He pointed out that the accident rate had previously been low on this stretch of U.S. 26 in western Wyoming. This was despite numerous curves and the vertical drop into the Snake River, often 300 to 400 ft. below.

Irion said that his long experience had shown this condition to be normal for all "scary" mountain highways. Evidently drivers are extremely aware of the danger of

excess speed at such points, and therefore keep their cars well under control. But, he observed, as soon as such highways are improved the accident rate often has increased. The new highways allow more speed and drivers either let their car get out of control due to extra speed, or hit a horse or deer before they can stop.

This observation points to the need for adequate warning and speed control signs—and spotlights one of the reasons why state police have become so tough on speeders in the intermountain area.—Editors.

HOW SHOULD ROAD CONTRACTS BE DIVIDED UP?

ONE OF THE LIVELIEST points of controversy today is the size of the road contract. Should the work available be divided into small jobs, so that more contractors will get work? Should more jobs, especially for expressways, be larger? Just what are the pros and cons?

Whatever the theoretical answer, the fact remains that there is a great difference of policy from state to state on this question. As revealed by analysis of some of the job trends in this issue, the answer is partly a matter of geography. In the sparsely populated plains states, a million-dollar contract is still considered a large one, and most highway work is awarded in much smaller sums. In New York and California, on the other hand, urban expressway segments are often being let in \$10 to \$15 million chunks.

This question should be settled, not on a hit-or-miss basis, or by political expediency, but with the fullest review of all factors jointly by the highway department and the contractors. There will be plenty of smaller offerings, for culvert work, modernization, widening, small bridge replacements, and the like. The important question is

how large to make the projects which involve very heavy quantities, costly urban complexities, or both. The engineers will get the most for the public highway dollar when the offerings bring the keenest competition; and when at the same time they are of a size permitting good over-all management including fullest utilization of equipment. Neither of these factors is an easy one to analyze.

To cite a couple of situations. In Detroit recently, according to a paper read at the Chicago AASHO convention, the Michigan highway department divided up a leg of the Edsel Ford Expressway into grading, paving or bridge parcels averaging \$1 to \$2 million each. An effort was made to make the projects economic ones, with respect to problems of access, traffic handling, structure work, natural geographical boundaries, etc. The contractor associations presumably had some voice in the decision, since the associations are consulted on many such matters in Michigan. At least the policy here is the result of deliberate consideration.

A second example is the current Illinois Toll Road program, which was awarded in a series of lettings

beginning in September, 1956, and totaling around \$280 million by midyear 1957. Record-sized jobs were awarded, one involving a 14-structure superinterchange and approach segments for \$24 million, and another such job for \$14 million. Many other jobs were in the \$4 to \$8 million range. Only a few were less than \$3 million. Nearly all involved structures as part of the complete package. Yet the scuttlebutt along the 187 miles of this work was that the demand for high speed necessitated such large scraper fleets that it was "too bad some of the project lengths couldn't have been greater," for better over-all management.

All highway officials agree that there will be jobs of all sizes. Sub-contractors as well as small prime awards will take care of the little fellows. The question of how large to make the big projects remains an important one, worthy of continuing analysis.

Possibly there should be more offering of alternate schemes, such as was done on the Ohio and Indiana turnpikes in past seasons, whereby the contractor could bid on A-B-C-D subsections, singly, in pairs or in toto.

New Approach Lighting System for Cleveland Airport

A system of brilliant flashing approach lights that guide landing planes to safety during periods of mist, fog, rain or snow is announced for Cleveland Hopkins Airport.

The high-intensity lights, developed by Sylvania Electric Products Inc., are synchronized to flash swiftly in sequence like a blue-white fireball streaking toward the safe landing area. The lighting network is known as Electronic Flash Approach System (EFAS).

"Commissioning of this EFAS installation on the approach to our instrument runway is a major contribution to flight safety and all-weather operation at Cleveland Hopkins Airport," said Claude F. King, commissioner of airports for

the city of Cleveland. The system was installed by the Civil Aeronautics Administration.

"By assuring early and unmistakable identification of the landing area during low ceiling and restricted visibility," Mr. King noted, "it represents a significant step in the extensive preparation necessary for aviation's jet age."

Each of the 20 flashing "strobebeacon" lights, lined up at 100-foot intervals from 3,000 ft. to within 1,000 ft. of the center of the runway threshold, is installed in front of a horizontal bar of five steady-burning white incandescent lamps. The bars provide the incoming pilot with roll guidance, or an "artificial horizon."

Twice a second the individual strobebeacons emit in sequence light bursts reaching a peak of 30 million candlepower to provide early identification of the landing area

for approaching planes. The blazing lights are non-blinding, however, since each flash lasts just 1/5000th of a second.

The centerline "roll guidance" bars inform the incoming pilot of his plane's position in reference to the horizon after the flashing strobebeacons have guided him to where the incandescent lamps are visible.

Additional roll guidance is provided by wider horizontal light bars at points 1,000 ft. and 200 ft. from the green-lit runway threshold. The 1,000-ft. lights are white and the 200-ft. lights, aviation red.

Presence of the approach lighting system means fewer unsuccessful approaches by airplanes attempting to land, and less diversion of planes to other airports because of weather conditions. As a result, flight delays and cancellations are lessened and air traffic control problems reduced.

Contractors and Engineers:

"Both Like It" —

"Results" Specification for Compaction

Notes on the new "end product" specification for rolling of subgrades and embankments in Washington state highway work, as reviewed at the AASHTO Construction Committee's recent session in Chicago.

EVERY CONTRACTOR who ever rolled a yard of dirt on a highway job will be interested in the talk given in one of the committee rooms at AASHTO's recent annual meeting in Chicago. Speaking at a Construction Committee session, R. H. Kenyon, chief engineer of plans and contracts division of the Washington state highway department, reviewed the pros and cons of his state's new compaction specification.

Kenyon's paper bore the formidable title: "Increased Competition and Effectiveness in Bidding Through Use of End-Product Specifications," but don't let that scare you. The story seems to be a happy one, for the state's highway contractors as well as the engineers (and even the inspectors), have endorsed the new controls. While the speaker considers that this type of specification is not everywhere applicable in highway work, he proceeded to endorse it fully for grading compaction.

For compaction of embankment the contractor in Washington is paid a unit price per cubic yard in the finished embankment. Prior to adoption of the present specification he was paid on a basis involving not only earth quantities but as many as eleven different per-day or per-hour equipment items for rolling and moisture control.

The new procedure was adopted in 1956, and was used for all 1957 jobs. Despite some minor difficulties, it is considered better than the former specification, and practically all the state's contractors report satisfaction with it. Only a few smaller operators still prefer the roller-hour method. The old way did give the resident engineer a basis for adjusting methods in the field without controversy, since the

contractor got paid for what rolling he performed.

The problem of specifying equipment under the old specifications had become increasingly difficult. Each manufacturer clamored to get his machines included. The engineer couldn't estimate with accuracy the roller time a job would need, because each type roller might require a different handling. Estimates of roller time per unit quantity made in advance of bidding as compared with the final pay quantity varied as little as 27 percent in one district to as much as 112 percent in another. The per-day per-hour method of bidding frequently encouraged contractors to unbalance their bids in an effort to outguess the quantities in the bid proposal.

Another source of trouble under the old regime was that of getting the contractor to start out with sufficient rolling equipment. Often they would promise to have on hand the number and kind of machines called for, but would begin moving dirt with no rollers yet arrived. With so many kinds of compacting equipment on the market, an attempt was made to classify them into various types falling into three classes—light, medium and heavy. It was found, for instance, that the heavy category alone was represented by as many as 12 manufacturers making 50 different models. The idea was abandoned as unworkable and open to endless controversy, especially in view of the fact that the efficiency of many of the models was unknown.

So, following the lead of some other states, Washington turned to the end-product specification. In August of 1956, three methods of earth embankment plus a method of rock embankment were set up.

Method A is seldom used and is applied only where high standards of compaction are not necessary. Methods B and C require moisture control and compaction in layers to a specified density. Method B requires 90 percent density except that the upper 24 in. shall be compacted to 95 percent density. Method C requires 95 percent density throughout the entire embankment. Rock embankment compaction is used where the materials have 10 percent or more of rock fragments larger than 4-in. diameter, and the compaction is controlled by specifying the amount of rolling for each 6-in. lift.

The state in specifying one or another of these methods of material continues to pay for furnishing and operating of aerating equipment as a bid item in wet areas only. This is the only pay item, however, other than yardage in place.

Favorable factors in the state's experience with the new "spec" are these: The contractor is encouraged to route his equipment so as to require minimum rolling, thus cutting down on job costs. He is also quicker to detect poor materials or poor work, and make correction. The engineers feel that modern equipment is more in evidence since the new method was adopted—more self-propelled units and more of the bigger compactors. All of this will help cut job costs.

Innovations in rolling are in evidence, such as the rig used by one contractor consisting of a Cat DW21 rubber-tired, single-axle tractor with a grid-type trailing roller.

Contractor Payments

Payments to contractors are easier to figure under the new scheme. Compaction has cost the state from 4 to 5 cents per cubic yard on larger jobs and up to 10 cents on most of the smaller ones.

On the unfavorable side, this speaker listed first the problem of proving to the contractor that it is necessary for him to keep on roll-

ing, when the inspector feels that conditions require it. This means that good inspectors must be used, and that their job is a continuous one requiring frequent tests.

Some contractors think that their hauling and other equipment will do the compaction job, without need for rolling. Kenyon emphatically stated that this is almost never the case. The problem for both the engineer and the contractor is to determine, from day to day, what constitutes the minimum rolling necessary to deliver the specified end product. In case of controversy, the engineer must prove—through field test—that rolling must continue.

Aeration is a problem also requiring a new attitude at times. Sheepfoot rolling as an aeration is often eliminated.

Mr. Kenyon, on aeration, explains: "On some contracts where we definitely expect aeration will be needed, we set up bid items per hour for certain types of equipment needed. If aeration becomes necessary on a project for which aeration items were not included in the bid items, we negotiate with the contractor for the per hour use of equipment needed. The latter case would be only where the moisture content is unusually high and the conditions are radically different from what could be expected from information available at time of the bidding."

Grid-type roller and other roller types are permitted under the new specification. The state is concerned only with the specified density. There will be cases, said Kenyon, where our special provisions will require the contractor to use certain types of special compacting equipment, but the furnishing and operating of the equipment must be included by the contractor in his bid item per cubic yard for compacting the embankment.

In the discussion which followed Kenyon's paper, spokesmen from several other states endorsed the Washington experience, while one delegate said that the end-product specification hadn't worked out; he explained that this department had "run into a stone wall" with contractors who united to resist adoption of the method.

In Washington, however, the picture is clear according to Kenyon. Guesswork on the roller-hours required, a prime cause of unbalanced bidding, has been eliminated. This is one of the chief gains to the state and contractor

alike, in that it has helped all parties. The contractor associations in Washington are credited with helping clear up this situation and foster the new procedure adoption.

\$900,000 Radio Contract Awarded To RCA

The Radio Corporation of America (RCA) was awarded a contract at \$898,798 for furnishing microwave trunk communications equipment together with a complete mobile communications system for Illinois' 187-mile tollway. The Illinois toll road commission staff had studied bids submitted for purchase of equipment and leasing.

Purchase was said to offer saving of \$25,000 over leasing. Also a leasing arrangement would result in the mortgaging of a sizable amount of future revenues to pay for the system over the first few years of operation.

New Lightweight Magnesium Curb Forms Cut Costs

Magnalite curb paving forms developed by Dotmar Industries, Inc., and made of strong magnesium alloy have proved successful on the Calumet Skyway in Chicago, recently under construction. Over 8,000 lin. ft. of these forms were employed this past season.

These forms are reported to be easy to handle, place and transport. One man can easily carry several of them. Weight per 10 ft. Magnalite curb form is 47 lb., compared to an average of 116 lb. for 10 ft. steel curb form. Forms 12 ft. in length are also available.

New Fire Fighting Units for Pennsylvania Turnpike

Highway officials charged with the responsibility of planning for the safety of travelers on interstate highways are watching with interest the recent development of fire fighting apparatus for highway use.

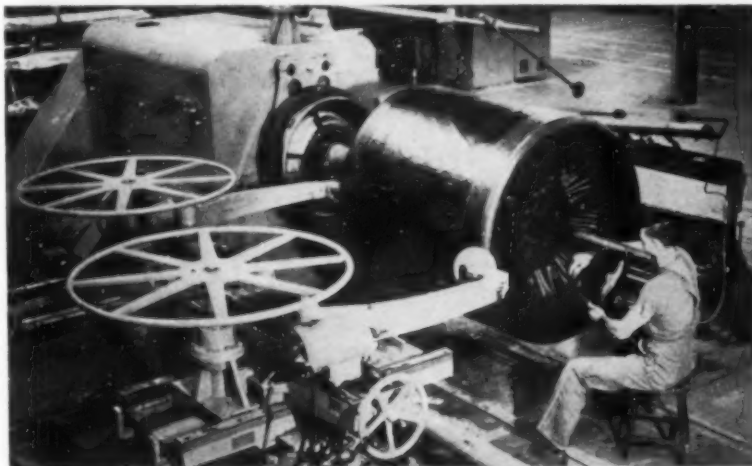
Truck tires which overheat and burst into flames are a common source of fire hazard on the Pennsylvania Turnpike, according to a bulletin from the Turnpike commission. Fires, of course, have frequently occurred as a result of collisions. The turnpike personnel has been instructed in the methods of coping with fires out on the road and new equipment has been ordered to help combat these blazes, according to the commission's safety director, Harold S. Roberts.

Illinois Has Record Road Construction Budget

A road budget of \$270,400,000 representing Federal and State allocated funds, was announced for Illinois highway work by Governor Stratton.

Slightly more than half of this sum will be spent in Cook County, largely on expressway projects, and with a heavy investment in right-of-way for selected expressway routes on the Interstate system. About \$41,730,000 will go for land for these projects.

Outside of the metropolitan Chicago area, the allocations include \$161,000,000 for new multi-laned interstate routes, and \$109,300,000 on the existing primary system according to Ralph R. Bartelsmeyer, chief highway engineer.



● A 10-ft. form section easily carried in each hand. Light-weight magnesium alloy is the explanation.

Huge Rock Slide on Snoqualmie Pass

THE HUGE EARTH and rock slide which on October 4, 1957, closed the Snoqualmie Pass highway in Washington state, was sufficiently cleared so that two-way traffic was once again begun at 8 a.m. on October 30—an example of alert handling of a serious emergency.

According to data received by letter from the Washington state department of highways, that and adjacent portions of the highway have been worked on since June 3 in the project of four-laning this highway. The highway had been kept closed during working hours (5 a.m. to 1 p.m.) on working days, being opened however the rest of each day and all day Saturdays, Sundays and holidays.

Three men were killed and one injured in the slide. Two of those killed, Clarence Sluder, maintenance leadman, and Knute Johnson, equipment operator, were department employees, the third, Carson Mundis, was a truck driver employed by the contractor, Max J. Kuney, of Spokane. The injured man, Ed Sauve, was an equipment



● Night-shift on emergency work with 3½-yd. and 2½-yd. shovels, as crew tackles 12,000 cu. yd. rock mass over the highway. (Associated Press Wire Photo.)

● Aerial of the slide showing its great size and the nature of the terrain where four-laning of the Snoqualmie Pass road has been in progress. (Associated Press Wire Photo.)



operator for the department.

The Max J. Kuney Co. did the work on clearing the slide, the superintendent being Jay Johnson in cooperation with Joe Russac, resident engineer for the state.

Lost in the slide by the Washington state highway department was a pickup truck, a heavy-duty motor grader and a truck. The contractor lost a Euclid rear-dump and a pickup truck.

Used in clearing the slide were two shovels (2½ and 3½ yd.), three heavy tractors, three rear-dumps and two D8 and one D9 tractor and three compressors and seven jackhammers.

Besides the equipment operators, the contractor's foreman and the highway department's engineering crew, ten laborers and drillers were employed on the job. It is estimated that 10,000 to 12,000 cu. yd. of material was moved to open the roadway to traffic. The slide was cleared from the top down, minimizing further slides and possible injury to workmen.



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ROADS AND STREETS, February, 1958



"Now, we're approving contracts for up to \$15 million in sized jobs."

ROADS AND STREETS INTERVIEWS

Warren D. Fish

Chief, Construction Division, U.S. Bureau of Public Roads

How the Road Program

In this exclusive interview report, the federal official who is closest to the contractor's interest in the national highway program reviews emerging patterns: contract size trends, letting schedules, award procedures in the states, competition, contract job volume in 1957 and 1958 prospects.

By Duane L. Cronk, Washington Editor

Q. Mr. Fish, we realize that the federal-aid program, in which the states match federal funds to build highways, constitutes a big chunk of the highway contractor's annual market. *Do you have any idea of how much work was awarded under the program in 1957?*

A. Well, so far we have summarized the actual figures for the first six months only, but projected, we figure that there will be close to 8,000 contracts.

Q. *How much money was involved solely for construction in the overall Federal-aid highway program for the year?*

A. I would estimate about \$2.5 billion.

Q. *How does this compare with 1956, the previous year?*

A. In the number of contracts awarded—about 11% increase; and in dollar volume, about 14%.

Q. Mr. Fish, I believe you told us the dollar value increase in 1956 over 1955 was about 13%. Your answer for 1957 indicates that the increase percentage-wise in actual work for contractors last year was little more than the increase for the previous year. *Does that mean that, as far as actual contract letting were concerned, the impact of the National Highway Program launched in July 1956 has not yet reached the contracting stage?*

A. By no means. The influence of the accelerated program was felt in 1957. It is being felt now. We have never looked for a big roadbuilding program—its "impact" as you call it—to develop overnight as a result of enabling legislation. There are al-

ways preliminary steps to be taken before the bulge in the pipeline, so to speak, reaches the contractor. I felt, and I am sure others did, 18 months ago when Congress passed the 1956 Act launching the big highway program, that, for a time, contract work would not increase much faster than it had been accelerating for the past several years. You people with *Roads and Streets*, and I think very wisely so, went along with that viewpoint in your "Blueprint" article 18 months ago.

But the contractor market was stimulated by the National Highway Program last year. In fact, without it, roadbuilding might have taken a drop or at least would not have risen nearly so much as it has. Toll road construction has dropped off, and so has non-federal-aid state work, slightly. Some of the states have used their available funds for matching on federal-aid work, especially where ways and means for raising added highway revenues have not yet been put in force.

Q. You have said before that the increased federal funds made available by Congress back in July, 1956—particularly for the ambitious Interstate system program—may still be several months in reaching the contract stage in any great volume. *When do you expect the states to hit their stride in their federal-aid programs?*

A. We feel here at the Bureau that a lot of Interstate jobs will come off the boards this spring, because much Interstate money and time have been spent on getting out preliminary plans. We expect to see them hit their stride this summer. That will be close to two years after the Act was passed, but



"We look for Interstate work to hit its stride this summer."



"We seem to see more joint ventures . . ."



"There are more large jobs now . . . but there is still a wide, wide range in job sizes."

is Shaping Up for Contractors

those who have been in this game for a long time have anticipated that this would be the pattern.

Q. Mr. Fish, what can you tell us about trends among the state highway departments, in contract sizes and competition as reflected in your review of 1957?

A. Well, as to contract sizes; there were more big jobs in 1957, and some larger jobs. As the Interstate projects came to the awarding stage, we anticipated this would be the trend. Before '57 the largest federal-aid contract awarded was for something less than \$10 million. Last year, a limited number of state highway departments set up contracts ranging upward to \$15 million.

Q. Does this mean that the roadbuilding market is becoming a market for just the big boys?

A. By no means. This is just looking at one side of the coin. Because, although the highway departments have let relatively more large contracts, they also have let many more small and medium-sized jobs. So the proportion remains just about the same as in previous years. I am sure the contractors in general, and the states, are quite satisfied with the pattern of contract sizes. The median federal-aid project contract is still only \$100,000 because there are so many secondary system highway contracts still being let. Even without the smaller secondary system projects in the computation, the median contract is only about \$250,000.

The capacities of contractors in the highway game, you will find, are quite varied. Many confine their bidding to only the sizes of contracts they know they are capable of handling. The highway departments are aware of this and will continue to plan various sizes of contracts to best utilize contractor potential, as they did in 1957.

Q. Mr. Fish, how did contracts for Interstate System jobs compare with contracts awarded for the so-called ABC systems—the regular federal-aid urban, primary, and secondary?

A. Some 1,200 contracts were let during the calen-

dar year of 1957 for Interstate System projects. The balance of our estimated 8,000 contracts would be for projects on the other federal-aid systems.

Q. Dollarwise, how much did the Interstate work come to?

A. About a billion dollars.

Q. Then the average Interstate System contract was about \$1 million.

A. Yes.

Q. Will you tell us something about these initial Interstate System jobs?

A. It is difficult to generalize on that question. The System varies in character—in design—from area to area, from state to state, so naturally the type of roadbuilding involved is variable too. In the urban Northeast, for example, we are seeing a lot of very complex engineering jobs get under way. Here the total project costs run high, of course. Much of the first Interstate project money that was obligated is going into surveys and preparation of plans and for the acquisition of right-of-way. In urban areas, many projects are six and eight lanes wide. There are a great many structures—interchanges, overpasses, underpasses, and separations at railroads. To keep traffic flowing conveniently and safely around these projects while under construction is a tough problem for the contractor.

Q. I think contractors are now aware that the huge sums going into these first Interstate jobs are not all for construction. Right-of-way is taking a big bite, isn't it? How much?

A. In addition to the approximate \$1 billion cost of Interstate jobs awarded last year, close to another billion went into right-of-way; some for those jobs and some for future work. In urban areas, of course, the cost of right-of-way will be higher than in rural areas.

Q. What about Interstate jobs in the Midwest and West?

Some Up, Some Down in State Highway Jobs Awarded to Contractors in '57

Data from a selection of states as compiled by Roads and Streets. Some figures are preliminary estimates only. Others are for periods other than the full calendar year, as noted.

STATE	TOTAL AWARDS FOR 1957	TOTAL AWARDS FOR 1956
Alabama	\$ 40,132,016 ⁽¹⁾	\$ 48,878,389 ⁽²⁾
Arkansas	20,327,072	27,135,762
California	247,500,000	250,100,000
Colorado	65,755,127	42,407,484
Connecticut	83,000,000	196,012,000 ⁽³⁾
Florida	95,000,000	73,000,000
Georgia	64,162,400	38,949,300
Illinois	142,000,000 ⁽⁴⁾	96,410,000 ⁽⁴⁾
Indiana	29,850,000	29,370,000
Kansas	66,000,000	46,000,000
Kentucky	43,100,000	28,100,000
Maine	15,800,000	13,500,000
Michigan	162,700,000	135,400,000
Mississippi	46,800,000	13,800,000
Missouri	78,164,164 ⁽⁵⁾	66,709,000
Nebraska	33,000,000	22,000,000
New Hampshire	18,000,000	15,389,627
New York	276,817,278 ⁽⁶⁾	297,400,332 ⁽⁶⁾
North Carolina	72,635,130	46,626,605
Oklahoma	60,420,833	40,390,836
Oregon	39,900,000	25,700,000
Pennsylvania	180,000,000	88,000,000 ⁽⁷⁾
Rhode Island	10,898,000	10,463,000
Texas	202,000,000	184,173,073
Utah	19,523,788	8,705,000
Virginia	58,600,000	52,249,000
Washington	70,000,000	45,342,282

(1) 10/1/56—10/1/57

(2) 10/1/55—10/1/56

(3) 1956 figure reflects heavy awards for the turnpike, largely completed during 1957.

(4) Figures do not include the Illinois Toll Road or the Toll Skyway in Chicago (representing some \$350,000,000 in awards during 1956 and 1957).

(5) To 12/1/57.

(6) Includes Thruway contracts.

(7) To 12/1/56.

A. Quite different, in general, from the Eastern contracts. Proportionately, there'll be more work here for the grading contractor and the paving firms, and less for the bridge men. This is understandable, because of the longer road mileages and relatively fewer structures. Right-of-way is lower, too, so more of the total will go into construction.

Q. Mr. Fish, in this emerging market of 1957, do you discern any significant contracting industry trends?

A. I think there was an increase in joint venturing. We saw somewhat more of this last year than heretofore in recent years.

Q. Do you think the contractors are teaming up so they can tackle larger jobs than they could otherwise?

A. Not entirely. That is in the picture, of course. But I think it reflects increasing specialization among contractors more than anything else. Because, you see, joint venturing is taking place not only on the big jobs, but we find as many as four firms going together to bid for a \$250,000 job. We have noticed that each appears to be a specialist in grading, paving, structures, or possibly other lines.

Q. But can't the merits of specialization be gained through subcontracting?

A. Oh, yes, and they frequently are—within the limitation of state or federal regulation. Contract requirements for federal-aid work provide that subcontracting be held to 50% of the job, except that specialty items may be subcontracted without regard to the 50%, when specified. But the specialists, by joint venturing, assume the responsibilities of prime contractors, and we seem to be seeing a trend in this direction.

Q. Mr. Fish, what about competition? A year ago, it was considered very aggressive, even "cut-throat." Has the increased volume of work on the market—some 15%, you say, in dollar volume—softened competition?

A. Oh, no. On the contrary, the states are apparently getting as many or more bids per project than in '56. At least our figures for the first six months, a heavy letting period, reveal that an average of better than 6 contractors bid on federal-aid jobs, compared to a bit less than 6 contractors during the same period of the previous year. This is an indication of continued competitiveness. This doesn't mean that contractors are out of work, but merely that they aim to keep their organizations and equipment continuously in service by scheduling their work load in advance. I think it also helps to verify that the states are regularly planning and scheduling their lettings pretty well in balance with available contractor capacity.

Q. How did bids compare with engineers' estimates?

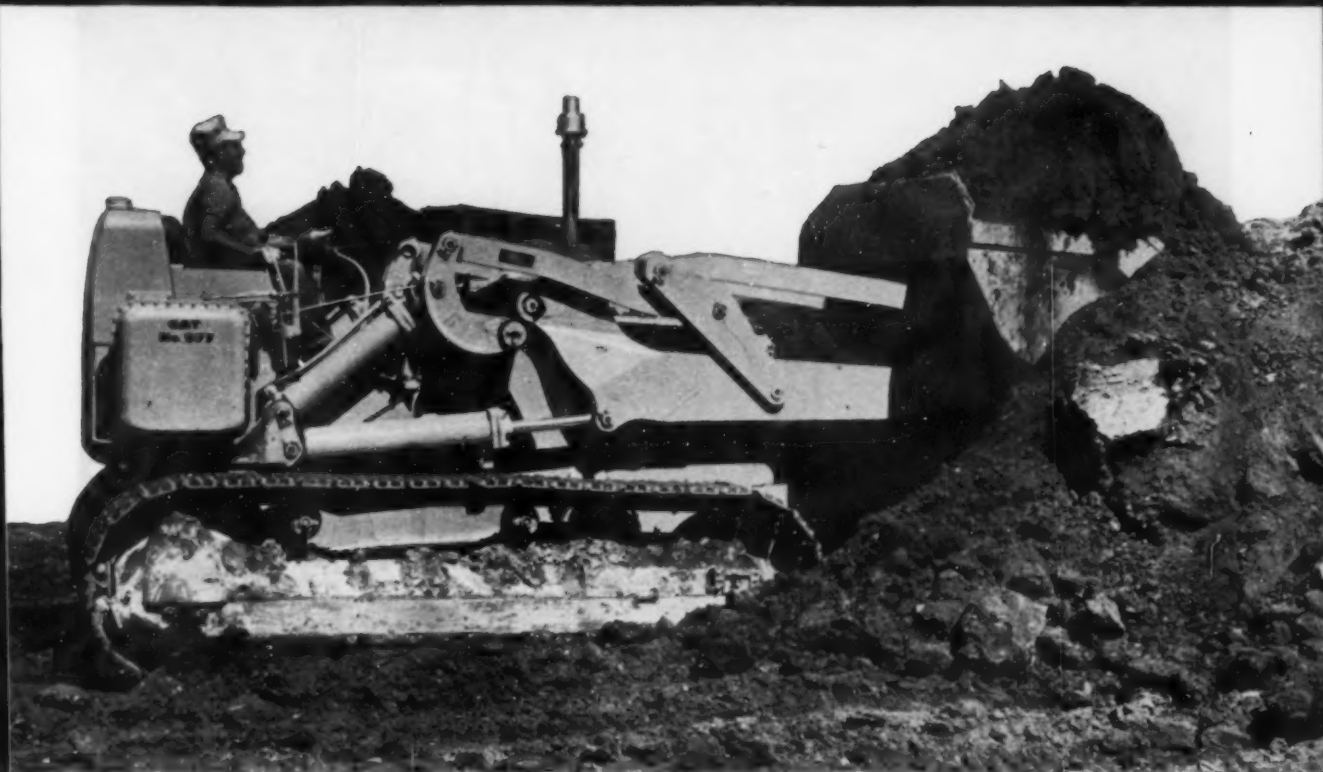
A. Well, in the first 6 months of 1956, contractor low bids averaged, nationwide, 3.7% under the engineers' estimates of the project cost. In the same period of '57, they ran 6.9% under engineers' estimates. This varies from state to state, season to season, and year to year, so that this change may not constitute a trend, however.

Q. Mr. Fish, a few months ago the Bureau made a survey of state highway department contracting procedures. Can you give us some of the results of that poll?

A. Yes, we asked state highway officials to answer a number of questions. Here are a few of the results:

- 33 states reported that they solicit bids for separate phases of a project, such as bridges, grading, and paving.

"WILL OUTPERFORM ANY MACHINE IN ITS CLASS!"



This Cat-built Traxcavator is loading out soil from spoil heap for grade fill and shoulders — loads out 10-yd. trucks, servicing 5 trucks with a 2-mile haul. Handling damp hard-pan, the husky No. 977 operates in

2nd and 3rd speeds and loads 10 yd. in 2½ min., averaging up to 2,000 yd. per 10-hr. day. The Minnesota State Highway job is 5.4 miles long and it calls for an excavation of 840,000 yd. of all classifications.

That's the way Mr. Markham of the E. Markham Construction Co., St. Paul, Minnesota, feels about his Cat No. 977 Traxcavator, shown loading out soil for grade fill and shoulders on a state highway improvement job in St. Paul.

Owner Markham feels that CAT-built equipment is the "most reliable and best mechanically." He says, "Caterpillar Tractor Co. has wisely shown an understanding of the contractors' equipment needs — no fancy do-dads that look good on paper and flop in operation — just down-to-earth improvements that really work."

Dependable, versatile performance is typical of Caterpillar's line of Traxcavators, from the rugged No. 977 to its tough, agile smaller brother, the No. 933. These finely balanced work units are engineered for the *hard* work, with welded steel frames, lift arms and cross braces of strong, box-section construction, and tilt arms of solid steel. They're easy to handle with quick-acting hydraulic controls.

The 50 HP No. 933, as well as the larger No. 955 and No. 977, are available in the new Series E, with extra-sturdy undercarriage for applications which put the greatest stress on your equipment. And the new side dump bucket can be had for the No. 955 and No. 933 Traxcavators. For complete details, see your Caterpillar Dealer. He'll be glad to talk your kind of language in a deal for the best in earthmoving equipment. And he'll back you up on expert service and parts you can trust.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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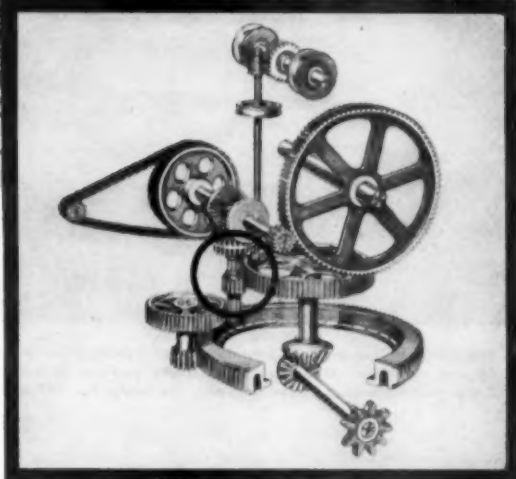
Successful contractors base their bids on a Manitowoc's ability to produce big yardage output—in less time—at lower cost. For instance, R. J. Nichols of New Bethlehem, Pa. uses a Manitowoc 2-yd. Model 3000 shovel to tackle a \$1,134,000 highway job for the State of Pennsylvania. The work involves widening a 10 mile, 2-lane highway 4' on each side and eliminating dangerous curves. An estimated 165,000 yards will be excavated before the job is completed. As a long-time user of Manitowoc equipment, Mr. Nichols, like many other prominent contractors, knows he can depend on his shovel to deliver more speed, reach and power to finish the contract on time—at a profit.

More "LOW-BID" Features

Simple Crawler Drive has positive, jaw-type steering—extremely maneuverable in tight quarters. **Completely Enclosed** travel gears and clutches keep going longer with less downtime. **Simple, Accessible Main Machinery** makes full use of power—is easy to get at for convenient servicing. **Dependable, Disc Type Clutches** are easily adjusted, with discs replaceable in minutes. **Smooth-Acting Air Controls** are available to keep your shovel runner at top operating efficiency the entire shift. **Self-Removing Counterweight** is available for fast, simple moves between jobs within highway load restrictions.

Bid more profitable jobs with Manitowoc—check the finest first, then decide!

Manitowoc Engineering Corp., Manitowoc, Wis.



Simple Design... Direct Power Flow

EXCLUSIVE SLIDING PINION arrangement (circle) makes use of only one set of clutches for travel, swing and boom hoist. Only working gears turn—all others are disconnected—for full power at the dipper.

ONLY 3 MAIN SHAFTS cross the rotating bed. FEWER GEARS AND PINIONS—only 17 are needed in the Model 3000.

GREATER ACCESSIBILITY reduces downtime for maintenance and servicing.

SEE YOUR DISTRIBUTOR NOW!



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ROADS AND STREETS, February, 1958

• Of the 38 states which follow this practice, 9 open bids for all phases on the same day, allowing the contractor the privilege of conditioning his bid to acceptance of "all or none" or more than one phase.

• 11 states permit the bidder to condition acceptance of a proposal upon the award of more than one contract. 39 do not.

• 14 states permit contractors to bid on several projects and limit the total value of work they will accept at one letting or may accept because of surety bond limitations. 36 states said they do not. (Only 3 states permit contractors to interpose such conditions as "if awarded Project X, disregard this bid").

Which Road Contractor Tops in '57

Near the top, at least, was S. J. Groves & Sons Co., of Minneapolis, Minn. This multiple-state operator showed up on state lists of highway contracts awarded during the 1957 year, with 11 jobs under five state highway departments, totaling \$28,326,000, plus participation in four Illinois Toll Highway contracts for \$29,903,000. (Latter jobs awarded in the 1956-57 letting program for the tollway and in the active stage during the year.)

Largest single highway contract awarded during the year other than for special work such as large harbor bridges, etc., was that awarded by the Illinois Toll Highway Commission to Western Contracting Corporation, Ryan Construction Co., M. J. Boyle, and S. A. Healy Co., in joint venture, for \$23,400,000. This segment involved a very elaborate interchange with many structures.

Illinois Toll Road Spawned Big Jobs

(Awards in 1956-57 program—including joint ventures as noted)

Contractor	No. of Awards	Bid Total
Contracting & Material Co., Evanston, Ill. Kenny Construction Co., Skokie, Ill. Louis Garavaglia, Centerline, Mich.	5	\$32,085,291
Gust K. Newburg Construction Co., Chicago Hoyle-Newburg Construction Co., Chicago	3	31,900,203
Western Contracting Corp., Sioux City, Iowa Ryan Construction Co., Evansville, Ind. M. J. Boyle & Co., Chicago S. A. Healy Co., Chicago	1	23,400,765
S. J. Groves & Sons Co., Springfield, Ill.	3	17,767,348
S. J. Groves & Sons Co., Springfield, Ill. Arcole Midwest Corp., Evanston, Ill. L. B. Strandberg & Sons, Chicago	1	12,135,670
Peter Kiewit Sons Co., Omaha, Neb. Condon-Cunningham Co., Omaha, Neb. Paschen Contractors, Inc., Chicago	2	11,551,600
McCarthy Improvement Co., Davenport, Iowa H. H. Mass Construction Co., Algonquin, Ill. Dillon Stone Co., Columbus Junction, Iowa	3	10,775,106
W. E. O'Neil Construction Co., Chicago D. W. Winkelman Construction Co., Syracuse, N. Y.	2	9,964,612
Eric Bolander Construction Co., Libertyville, Ill. E. A. Meyer Construction Co., North Chicago, Ill.	2	7,246,790
Peter J. Crowley Co., Chicago Standard Paving Co., Chicago	2	6,531,689

Interstate turnpikes continued locally to be "big business" in 1957, as witness the \$273 million spent in the 16 months since September, 1956, on the Illinois toll road.

As of December 31 only two major contracts remained to be awarded, for lighting and for maintenance buildings. All main line right-of-way has either been acquired or made available for construction with the exception of six parcels of land, five of which are

scheduled for condemnation.

Since ground breaking on September 22, 1956, a total of 37½ miles of tollway has been paved. Earthmoving done as of December 12, amounted to 53,597,000 cu yd out of an estimated 73,000,000 cu yd total. Paving operations were suspended for the 1957-58 winter but contractors are continuing work on bridges and other structures. The road's opening date is December 31, 1958.

• Sub-contracting is permitted in all states, but it varies from 25% to 50% of the contract, and for Federal-aid work follows the required provisions I spoke of earlier.

• 11 states said they have received scattered complaints to the effect that small contractors are not being given opportunity to participate fully in the program. Some of the complaints were from contractors who had expanded but had neglected to ask for requalification, or had failed to ask for bonding evaluation in keeping with their expansion. 39 states said they were aware of no dissatisfaction.

• 4 states indicated there had been some complaint that while there is a good spread in contracts up to \$1 million, there was a jump to contracts of \$5 million or more, for which only a few large firms can bid. These conditions were found to be true in isolated lettings, but not in general practice. 46 states replied they have not had any complaints.

Q. Mr. Fish, your review of contract trends has been most interesting. Would you care to make any observations about 1958?

A. Only this, we expect to see even greater impetus in the highway construction program as the states get more work planned, and if their sources of revenue are firmed up to meet highway needs, not only for the Interstate and the regular Federal-aid primary urban and secondary programs, but for other state work, and work by cities and counties. These all are a part of the nation's highway program that must be considered in the evaluation of the amount of work contractors expect to see coming their way.

Highway Contractor Competition Toughened in 1957 Program

A state by state analysis of federal-aid contracts (including secondary system) awarded during the first half of 1956, compared to the first half of '57.

State	Number of contracts let ('56)	Average number of bidders per contract ('56)	Value of contracts let (total of low bids) '56	Percentage total low bids were under engineers' estimates	Percentage the total low bids was over	Number contracts let in '57	Aver. number of bidders per contr. in '57	Value of contracts let in '57 (total of low bids)	Percentage total low bids were under engineers' estimate in '57	Over '57
Alabama	34	7.4	12,509,064	2.3		53	10.0	16,064,677	10.4	..
Arizona	15	8.2	6,137,972	9.0		16	8.5	8,228,708	..	5.0
Arkansas	12	6.8	3,917,000	12.3		15	7.9	7,811,768	.9	
California	35	4.7	35,912,618	..	0.9	55	6.4	90,699,445	4.4	
Colorado	19	8.8	7,214,328	..	0.7	28	8.8	17,382,983	..	.3
Connecticut	24	3.8	2,967,205	..	6.0	27	6.3	26,121,139	4.6	
Delaware	7	5.1	2,993,310	..	3.9	5	5.8	3,122,882	10.6	
Florida	16	4.8	11,161,918	..	1.9	14	5.6	18,062,035	11.9	
Georgia	13	8.2	8,034,205	7.5		16	5.4	10,851,137	8.7	
Idaho	16	4.0	3,323,079	0.4		7	5.9	3,154,662	7.1	
Illinois	112	4.5	46,142,079	3.0		130	4.3	57,743,601	..	2.9
Indiana	39	4.4	10,635,268	12.6		18	4.2	3,655,881	13.9	
Iowa	101	5.5	12,959,165	2.6		138	6.6	25,428,430	5.5	
Kansas	95	4.9	12,999,891	2.0		172	5.5	17,971,310	8.9	
Kentucky	8	5.3	2,040,948	5.1		9	4.5	3,508,873	10.5	
Louisiana	4	6.5	4,846,226	..	3.7	16	4.0	15,181,238	5.9	
Maine	8	6.0	3,791,112	2.2		8	4.5	3,752,824	..	2.5
Maryland	26	6.2	13,998,311	4.8		13	4.8	9,090,991	4.8	
Massachusetts	30	5.7	10,733,073	7.8		12	8.4	25,306,164	6.7	
Michigan	75	5.6	31,437,929	3.7		82	5.7	44,616,848	6.1	
Minnesota	38	6.3	19,915,100	2.9		34	8.9	20,890,501	6.7	
Mississippi	26	9.6	3,990,044	11.7		33	10.3	23,893,286	12.1	
Missouri	15	5.5	15,759,429	7.6		26	5.5	35,519,073	5.1	
Montana	24	5.6	6,190,493	3.7		21	9.9	6,452,696	15.3	
Nebraska	50	4.8	8,928,286	3.9		47	6.5	11,142,969	12.6	
Nevada	7	4.9	3,180,155	5.0		6	4.2	4,142,246	4.3	
New Hampshire	6	5.3	3,814,114	10.0		11	5.8	5,017,009	10.6	
New Jersey	17	5.2	8,808,370	13.9		12	7.2	14,934,699	14.0	
New Mexico	12	5.4	6,863,599	10.4		21	6.7	21,313,788	22.1	
New York	57	4.1	109,758,508	10.2		87	3.9	117,574,108	11.0	
North Carolina	63	6.2	13,393,879	7.5		62	7.7	22,157,664	9.0	
North Dakota	22	7.0	7,171,295	..	0.2	34	10.7	14,855,890	11.4	
Ohio	12	4.3	11,237,995	7.4		14	5.8	32,921,680	16.7	
Oklahoma	40	7.6	13,017,289	4.7		74	6.0	20,879,377	5.7	
Oregon	29	5.2	4,317,173	7.0		25	7.1	7,732,640	5.0	
Pennsylvania	33	5.2	44,502,888	2.3		44	5.0	85,214,192	6.5	
Rhode Island	1	3.0	1,774,696	12.0		4	3.9	8,704,176	10.5	
South Carolina	37	7.4	6,776,449	..	2.2	47	6.4	7,919,755	3.0	
South Dakota	28	8.2	8,680,392	3.9		23	10.3	5,720,232	15.4	
Tennessee	17	8.1	8,407,054	8.6		13	11.0	6,928,248	12.1	
Texas	77	6.5	47,017,352	1.4		96	7.4	76,222,194	4.3	
Utah	5	4.2	1,331,097	4.8		13	5.8	6,489,569	1.1	
Vermont	6	3.2	3,050,946	..	1.8	3	7.0	4,201,482	3.8	
Virginia	52	2.9	8,528,511	6.9		38	3.5	8,323,832	14.3	
Washington	45	5.5	15,510,477	4.7		41	6.0	15,654,824	8.9	
West Virginia	16	4.1	4,874,129	..	6.3	4	6.5	1,543,595	3.9	
Wisconsin	26	6.2	14,259,198	4.6		28	8.6	11,189,332	11.6	
Wyoming	16	8.2	5,586,388	2.0		25	10.0	11,758,563	5.9	
Dist. of Col.	8	3.1	3,402,421	7.0		11	7.0	6,310,458	4.6	
Hawaii	4	5.5	1,849,444	0.8		2	6.0	1,376,259	..	9.5
Puerto Rico	1	5.0	1,191,750	..	5.8
Total	1,479	5.6	656,813,832	4.9		1,733	6.5	1,024,739,933	6.9	



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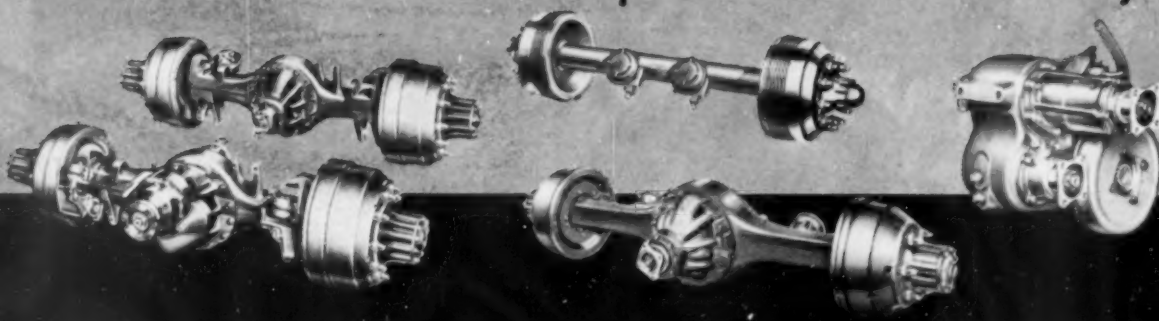


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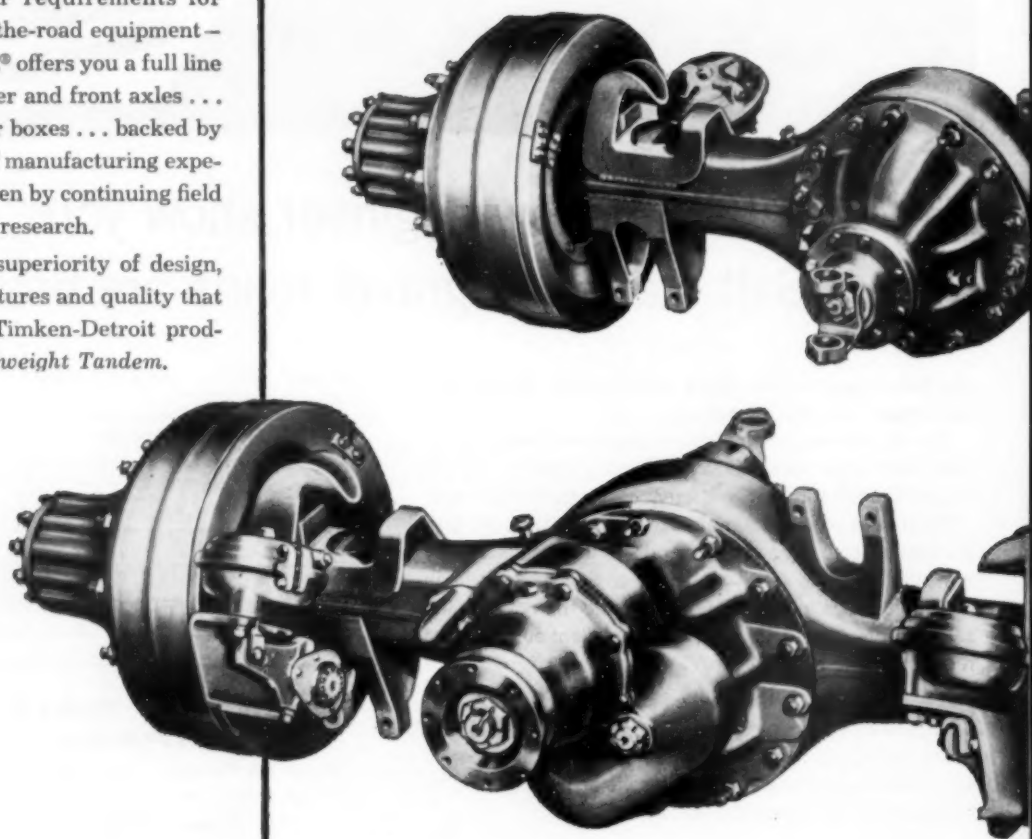
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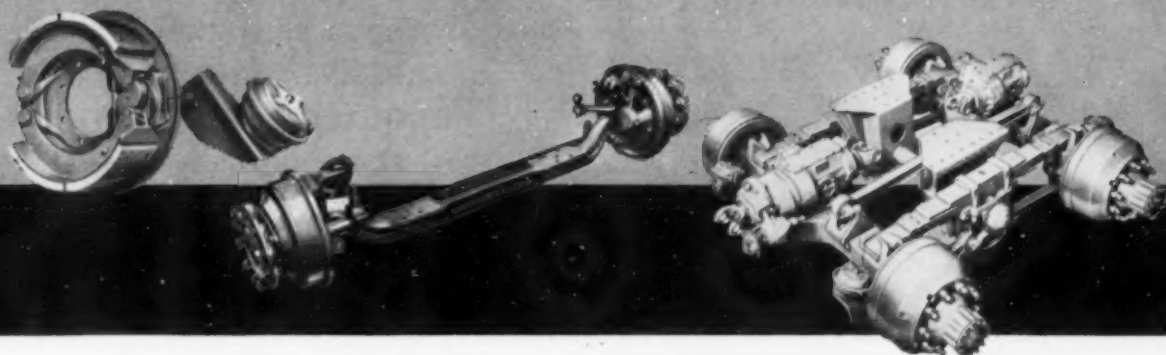
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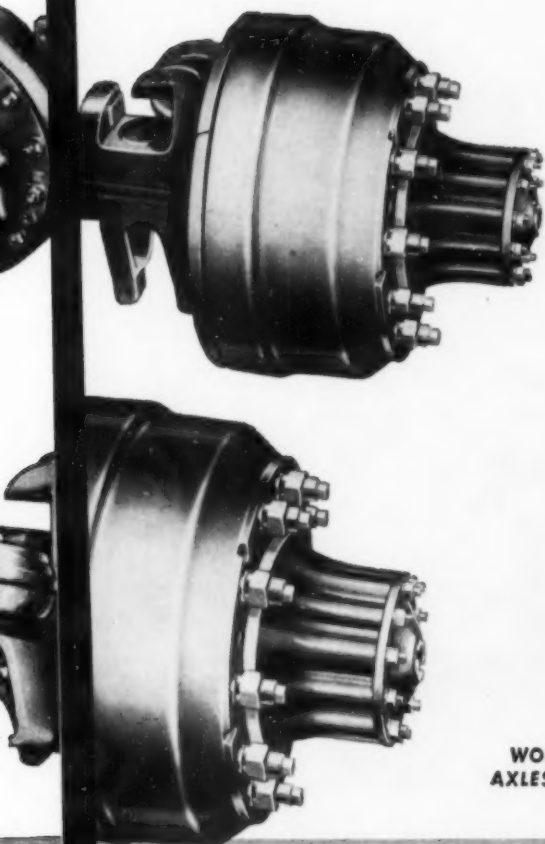
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These Contractors Were Awarded Large Totals of State Highway Jobs in 1957

A selection of firms from various states who were given the largest dollar total of state highway contract awards during the 1957 calendar year.

STATE	NO. OF AWARDS	BID TOTALS	STATE	NO. OF AWARDS	BID TOTALS
Arizona			Indiana		
Isbell Construction Co.	3	\$ 2,105,420	Fruin-Colnon Contracting Co. & H. H. Hall Construction Co.	1	2,623,682
Tanner Bros. Contracting Co.	6	1,783,400	Robert R. Anderson Co.	2	2,600,205
Copper State Construction Co.	3	1,759,677	Arcole Midwest Corp.	5	2,407,382
Rogers Construction Co.	2	1,684,309	Michael J. McDermott & Co.	3	2,350,876
Wallace & Wallace	1	1,463,530	Allied Structural Steel Cos.	7	2,176,962
San Xavier Rock & Sand Co.	4	1,269,933	W. E. O'Neil Construction Co.	1	2,097,489
T. M. K. Construction Co.	2	1,129,729	John C. Tully Co.	2	2,040,449
Dale F. Payne	1	1,042,601			
Arkansas			Louisiana		
Ben M. Hogan & Co.	3	\$ 5,476,770**	Smith & Johnson, Inc.	6	\$ 2,025,328**
Reynolds & Williams	7	3,525,300	Calumet Paving Co.	2	1,649,582
D. F. Jones Construction Co., Inc.	4	1,503,450	Hunt Paving Co.	1	1,453,741**
W. D. Jeffrey Construction Co.	1	1,450,560	Traylor Bros., Inc.	4	1,316,512
W. R. Fairchild Construction Co. Ltd.	1	1,379,080	Stone City Construction Co.	2	1,204,513
Anchor Construction Co.	1	1,112,720	McMahon Construction Co.	6	1,183,245
			Reith-Riley Construction Co.	5	1,017,680
California			Michigan		
Guy F. Atkinson Co.	3	\$ 14,789,696	T. L. James & Co., Inc.	32	\$ 14,736,624
Peter Kiewit Sons' Co.	4	11,742,602	W. R. Aldrich & Co.	5	5,052,833
J. E. Haddock, Ltd.	5	10,912,120**	Boh Brothers Construction Co.	2	3,003,144
Frederickson & Watson Construction Co.	6	9,017,199**	Hall and Holland	10	2,717,379
McCammon-Wunderlich Co.	2	8,583,873**	Campbell Construction Co., Inc.	4	2,084,500
Wunderlich Contracting Co.	2	8,583,873**	Cook Construction Co.	1	1,966,931
Frederickson & Kasler	2	8,468,755	W. H. Patterson & Co.	4	1,922,877
Chas. L. Harvey, Inc.	1	7,925,295	L. M. Winford	5	1,872,773
Griffith Co.	7	7,798,042	Coastal Contractors, Inc.	6	1,824,606
Johnson, Drake & Piper	1	4,935,599	Texas Bitulithic Co.	4	1,673,756
Cox Bros. Construction Co.	4	4,886,968	R. B. Tyler Co.	3	1,533,715
A. Teichert & Son, Inc.	11	4,594,821			
Granite Construction Co.	17	4,458,131	New York		
Connecticut			U.S. Steel Corp., American Bridge Div.	2	\$ 7,245,590
Frouge Construction Co., Inc.	4*	\$ 12,995,525	Cooke Contracting Co.	13	6,529,615
L. G. DeFelice & Son, Inc.	3	7,999,683	Denton Construction Co.	5	6,419,973**
Savin Brothers, Inc.	2	7,433,092	Johnson-Greene Co.	6	5,512,376**
M. A. Gammino Construction Co.	3	5,288,116**	L. A. Davidson	13	5,320,427
Wexler Construction Co., Inc.	2*	5,170,000**	Loselle Construction Co.	3	3,585,412
The Associated Construction Co.	3	4,158,000	Sargent Construction Co.	4	3,708,410
Consolidated Builders, Inc.	1	3,359,260	Reith-Riley Construction, Inc.	12	2,538,830
Brunali Construction Co.	1	3,013,064			
Mariani Construction Co.	4	2,696,284			
S&M Construction Co.	1	2,628,784			
Illinois					
S. J. Groves & Sons Co.	2	\$ 7,267,119			
Thomas McQueen Co.	9	5,411,269			
Paschen Contractors, Inc.	5	5,384,297			
U.S. Steel Corp. American Bridge Div.	6	4,883,431			
W. J. Sheppard & Co.	4	3,273,551			

*including turnpike buildings

**Including joint ventures

**Including joint ventures

STATE	NO. OF AWARDS	BID TOTALS
D. A. Collins Construction Co., Inc.	1	4,959,515
Davis Tuckhoe	1	4,811,967
Schacht Steel Construction	2	4,560,184
Dalrymple Gravel & Contracting	1	4,238,563
Frank Mascali & Sons	1	4,122,359
Terry Contracting	1	3,460,942
Ohio		
Maxon Construction Co., Inc.	2	\$ 6,840,723
S. J. Groves & Sons Co.	2	5,617,561
George W. Lathrop & Sons, Inc.	2	5,379,837
The Baker & Hickey Co. Associates	2	5,192,810
Codell Construction Co.	1	4,315,942
Frank Mashuda Companies, Associated	1	4,173,519
Lauder & Son, Inc.	1	3,068,072
C. F. Replogle	2	3,046,671
D. R. Smalley & Sons, Inc.	1	2,940,165
Great Lakes Construction Co.	1	2,743,753
E. K. Bridge Construction Co.	1	2,665,049
Oregon		
Rogers Construction Co.	7	\$ 5,071,449**
Rogers Construction, Inc.	3	3,389,483**
Central Paving Co.	5	2,177,246
Roy L. Houck & Sons	3	1,831,509
Warren Northwest, Inc.	7	1,066,467
Kuckenberg Construction Co.	1	1,049,843
South Dakota		
John F. Beasley Construction Co.	2	\$ 5,926,642

Northwestern Engineering Co.	2	2,956,560
G. H. Lindekugel & Sons	11	1,273,367
Massman Construction Co.	1	1,093,854
Summit Construction Co.	4	1,023,541

Texas

Cage Brothers	12	\$ 13,915,078**
Texas Bitulithic Co.	14	13,151,971
Austin Bridge Co.	12	8,983,417**
Austin Road Co.	6	8,489,967**
Killian-House Co.	5	5,367,221
Austin Contracting Co.	4	4,282,861**
Gulf Bituminous' Co.	2	3,991,723**
Gulf Bitulithic Co.	6	3,934,572**
W. R. Aldrich Co.	2	3,870,812
Heldenfels Bros.	9	2,842,550
South Texas Construction	9	2,234,937
Worth Construction Co.	5	2,234,848**
Ben Sira Co.	2	2,179,910**

Virginia

Nello L. Teer, Co., Inc.	3	\$ 6,603,607
Ames & Webb, Inc.	3	2,733,614
W. E. Graham & Sons	3	2,721,940
Adams Construction Co.	25	2,223,891
Talbott-Marks Co., Inc.	3	2,130,386
English Construction Co., Inc.	2	2,118,371
Moore Brothers Co., Inc.	5	1,743,012
Faulconer Construction Co., Inc.	2	1,289,950
Sam Finley, Inc.	11	1,271,026
Malpass Construction Co., Inc.	1	1,191,324
Barnhill & Long, Inc.	1	1,031,727

**Including joint ventures

New Tree-Smashing Behemoth Demonstrated



The latest machine to speed the clearing of jungles and forests as an aid to increasing the food production of the world has been tried out in Texas by its developer, R. G. LeTourneau, Inc., of Longview, Texas. The "Electric Tree Crusher" weighing 280,000 lb. leaves a 20 ft. wide path of matted pulp and splinters, clearing an acre of land every 15 minutes in average timber growth. With the power of six heavy crawler tractors, it measures 75 ft. long, with rollers 9 ft. in diameter, and weighs 140 tons. The machine's biggest usefulness is expected in areas of Africa and South America, in conjunction with large-scale land clearing projects now in progress or contemplated.

Portland Cement Association Elects New Board Members

The Portland Cement Association during its annual meeting in Chicago elected four new members to its Board of Directors: Eugene D. Hill, president, Louisville Cement Co., Louisville, Ky.; C. T. Fuller, vice president, Allentown Portland Cement Co., Allentown, Pa.; B. B. Pelly, vice president, Olympic Portland Cement Co., Ltd., Seattle, Wash.; and L. T. Welshans, general manager of the Cement and Coke Division, Standard Portland Cement Division, Diamond Alkali Co., Cleveland, Ohio.

George E. Warren, president of Southwestern Portland Cement Co., Los Angeles, continues as chairman of the Board.

The Association, a national organization to improve and extend the uses of portland cement and concrete, is voluntarily supported by more than 70 companies manufacturing portland cement in the United States and Canada. Its activities are limited to scientific research, development of new or improved products and methods, technical service, promotion and educational effort, and safety work.



4:30 p.m.

Conditions hazardous



5:15 p.m.

Rush hour traffic moves safely

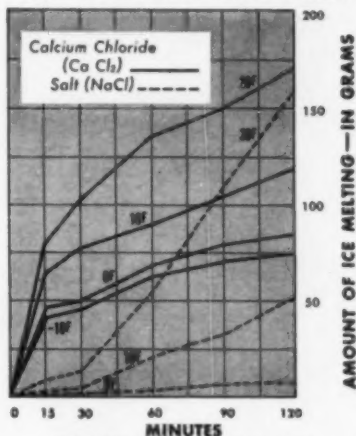
COLUMBIA CALCIUM CHLORIDE

makes streets and roads safe faster

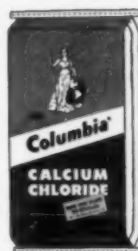
Speedy ice and snow control keeps towns and highways running smoothly, holds fatalities and injuries down. And here are new test results proving once again that Columbia Calcium Chloride brings safety to surfaces *faster*. This skid-proofing chemical melts 8 times as much ice within thirty minutes after application as is melted by salt. Here are comparative results over a two hour period:

Better order an ample supply of Columbia Calcium Chloride today through your nearest Columbia-Southern District Sales Office.

AMOUNT OF ICE MELTED
15 TO 120 MINUTES
350 Grams ice in 7" by 11" pan
40 Grams chemical (based on 100% NaCl or CaCl₂)



NOTE: NO reaction with salt at -10 F.



Columbia Calcium Chloride is available in both High Test Flake (94-97% CaCl₂ content) and Regular Flake (77-80% CaCl₂).

**COLUMBIA-SOUTHERN
CHEMICAL CORPORATION**

SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER - PITTSBURGH 22 - PENNSYLVANIA



DISTRICT OFFICES: Cincinnati • Charlotte
Chicago • Cleveland • Boston • New York
St. Louis • Minneapolis • New Orleans
Dallas • Houston • Pittsburgh • Philadelphia
San Francisco

IN CANADA: Standard Chemical Limited
and its Commercial Chemicals Division

Safeguard Winter Traffic with Columbia Calcium Chloride

... for more details circle 257 on enclosed return postal card

ROADS AND STREETS, February, 1958

Rugged ASPHALT paving saves



Ribbons of velvet smoothness . . .
MODERN **ASPHALT** HIGHWAYS

Washington \$30,000 a mile

***...Saves State \$381,000
in first cost on 12.7 miles
of Interstate Highway.
Maintenance savings
expected, too!***

For the Prairie Creek to Tumwater section of U. S. Highway 99, the State of Washington chose modern Asphalt pavement.

By so doing it saved thousands of dollars in initial costs alone. The entire paving cost for 12.7 miles was \$826,978 . . . with savings of \$30,000 a mile compared with a connecting slab-paved section. *And more savings are to come . . . for Washington's records indicate that Asphalt pavements cost less to maintain.*

As records show in state after state, modern Asphalt highways are not only economical but also rugged and safe.

Rugged . . . because layer-upon-layer construction "locks" surface to the foundation, builds up strength and resilience.

Safe . . . because modern Asphalt pavement is traction-textured for high skid-resistance. There is less glare . . . greater traffic-line visibility.

In winter, snow melts faster and Asphalt pavement is not harmed by de-icing chemicals.



ENGINEERED FOR RUGGED WEAR

Modern Asphalt construction is a triumph of road-building science. Built-up layers spread the load . . . absorb shock and pounding. Economy, safety and comfort are built-in to last.

THE ASPHALT INSTITUTE
Asphalt Institute Building, College Park, Maryland



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AASHO Convention Delegates Discussed—

Contractor Problems in the Road Program

Credit troubles would be eased by quicker payment for completed work and for materials delivered, contractors said. Meeting also touched on delays in utility relocation, "changed conditions" clause.

A NUMBER OF ACTIONS affecting road contractors were taken at the state highway engineers' annual convention. Representatives of the Associated General Contractors of America urged the states to do everything they could to speed up money due contractors for completed work.

"In addition to retained percentages, many states withhold a certain percentage of quantity payments," the AGC said, "and we recommend to the BPR and the AASHO that contractors be paid full allowance for current quantities on periodic estimates, realizing that the contractor's bond and the customary retained percentage will cover any occasional small overpayment, and further recommend that the Bureau of Public Roads cooperate fully in advancing funds where circumstances create over-runs during construction."

The contractors also requested payment for delivered materials. "This could enable the contractor to purchase and store materials when prices and delivery are advantageous to him," AGC said. "If he cannot collect for them, his credit is sometimes dangerously extended."

"The Corps of Engineers, Bureau of Yards and Docks and Bureau of Reclamation customarily pay for materials to be incorporated in the work when they are delivered to the site and properly stored. Payment is made on receipted invoice at the rate of 100% of the delivered cost less the 10% retainage."

AGC would like to see the following standard specification adopted by the state highway departments.

"When a contractor purchases materials which will be incorporated in the work it is proper to pay for the delivered cost of those materials in the first regular progress estimate after delivery and

proper storage. It is not proper to make payment dependent upon the time such materials will be incorporated as market conditions and not the construction schedule may be the governing economic factor. As long as purchase and actual construction maintain a reasonable ratio within the limits of funds available for the contract there should be no restriction on advance purchase of materials. Payments for such materials should be contingent only upon the approval thereof by the engineer."

Such measures would ease the credit problem inherent for contractors in the accelerated road-building program, the association feels. Although not serious now, the present policy in some states of typing up contractor capital in these ways may seriously hamper some roadbuilders when the program hits its peak.

Cost of Utility Delays

Both contractors and highway officials are concerned over delays caused by the slowness of utility companies in relocating their facilities from highway rights-of-way.

AGC suggested that conferences be held as soon as possible after award of the contract between representatives of the contractor, state highway department, and the utility concerned, to schedule the relocation of utilities.

According to James Sprouse, manager, Highway Division the AGC, Florida follows this policy.

Another state that has found such conferences successful is Wisconsin. Richard Barrett, assistant attorney general, reported at the AASHO meeting that he knew of no case ever reaching the courts in which a contractor had sued for damages resulting from utility delays.

"I am informed by an executive of one of the biggest Wisconsin utilities that the system, which has been

worked out by the utilities and the State Highway Commission whereby they work together on long range planning, is extremely successful," he said. "The district offices of the Highway Commission contract local utilities, and potential construction for the next construction season is thoroughly explained. The utility knows what to expect, and has ample time to take appropriate action. I can, however, see that as the amount of urban expressway construction increases there may be times when the relationship between the highway departments and the utilities deteriorates to such a point where legal actions here discussed may become common."

• **Contractor Change Order.** A "changed conditions" clause in state highway contracts was suggested by a New York State attorney at AASHO's Chicago convention before Christmas.

Saul C. Corwin, Counsel for the New York Department of Public Works, told the officials:

"We have seen an ever-increasing number of court determinations based on claims by highway contractors for additional compensation because of extra work—work which they allege was made necessary by conditions encountered at construction sites which were not described in the specifications, or contract."

At present, he said, the state's highway contracts do not have sufficient latitude to permit adjusting for changed conditions. The federal government has met this problem by inserting a special clause in its construction contracts which allows the contracting agency to investigate allegedly changed conditions and make settlement with the contractor. Mr. Corwin suggested that a similar clause might cut the legal work load of state highway departments and, more importantly—keep such adjustments a matter of engineering judgment.

"An adjustment made at the proper time by engineers will be much more satisfactory than legal actions taken years later."

Such a clause would permit an

Rubber-tired dozer replaces pair of crawlers does 20% more work than both



Doing a job that was formerly assigned to two medium-size crawler tractors, a single 210 hp rubber-tired Tournatractor® consistently does 20% more work than the crawler team, according to James J. Murray, Director of Public Works, Colorado Springs, Colo.

At the city's nearby Mesa Springs pit, the LeTourneau-Westinghouse Tournatractor stockpiles gravel during the off season, and feeds the crusher during the roadbuilding season. City trucks carry the material to the job site.

Test led to purchase

"The county had a Tournatractor," Mr. Murray said, "and we borrowed it, to see if it could replace the two crawlers we were using. It did the job so well that we bought one of our own for full-time use."

Material at the pit is decomposed granite, laced with occasional strips of clay. Operator puts the 17 mph Tournatractor in 2nd gear for dozing an average 300' cut. Tournatractor shifts to high reverse (6.5 to 7.2 mph) to reposition for next push.

Travel time slashed

Pit work is only a small item on this Tournatractor's schedule. The

... for more details circle 295 on enclosed return postal card

rubber-tired tractor, equipped with Angledozer® blade, ranges over the entire city on emergency service as well as on routine maintenance and construction work.

"Before we purchased the Tournatractor," Mr. Murray said, "we had to use a crawler for those scattered chores. We had to load it on a low-boy, haul it to the job, then unload. With this rubber-tired machine, we can drive it to the next job in 1/2 hour — rather than 1/2 day."

Keeps busy in all seasons

Colorado Springs' versatile Tournatractor keeps busy all 12 months of the year. Its dozing power has been used in pioneering roads for new subdivisions. In the winter, it removes snow with regular blade.

"We've used it to clear a path through 3' snow in order to reach stalled cars," Mr. Murray asserted.

Salvaged sunken crawler

"Recently, a city crawler, working in a creek area, sank into quicksand up to the seat," he recalled. "We anchored 2 other crawlers, with blades in ground, to act as pivots. Then we rigged up a 4-line block and tackle and used the Tournatractor to pull the crawler out."

Dozing big load of decomposed granite, Colorado Springs' versatile Tournatractor builds up stockpile to be fed to gravel crusher at city-owned pit. Tournatractor pushes load of up to 2 1/2 yds. in second gear... repositions fast in high reverse, up to 7.2 mph.

Replacing 2 medium-size crawlers, and doing 20% more work per day than the two combined, 210 hp Tournatractor sharply reduces operating costs at Mesa Springs pit. City also uses 17 mph tractor for clean-up in new subdivisions, for winter snow removal, and for salvage of vehicles. Mobile machine cuts between-job travel time from half-days to half-hours. Machine is seldom idle.



"It not only freed the trapped machine, but moved the other crawlers about 3' in the process."

The experience of Colorado Springs is typical of cities and towns which have bought high-speed, work-and-run Tournatractor. Ask for specifications and fact-filled owner reports on how this rubber-tired workhorse can save your taxpayers' money!

CT-1590-PJ-1



LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

appeal by the contractor and his recourse to court action if he desired. It would place a heavier burden on state engineers to make "Much more extensive" subsurface exploration of projects. (It is the discovery of subsurface conditions other than those described in the plans which provoke the greatest number of claims by contractors.)

"The contract documents and plans must clearly present to bidders the anticipated subsurface conditions," he said. "Construction contractors with vast experience have told us that in past years when they bid on State Highway construction work, of necessity, they had to gamble and take a calculated risk on materials of unclassified excavation and fill which would be required to produce the necessary profile grade. In many instances, they anticipated that the profile grade would be subsequently raised to eliminate or reduce rock excavation or other difficult excavation which was not foreseen when the original subsurface explorations were made for the contract. This practice, while it had its evils, was not necessarily entirely unsound. It was recognized as a contingent risk based on regular business practice.

"However, with present-day standards of construction, particularly for interstate routes and controlled access highways with center malls and cloverleaf intersections, a most accurate determination and excavation balance must be established if we are to decrease—or hope to eliminate these "changed conditions" claims.

"As you know, in the construction of our current type expressways and super-highways, the profile grades are so definitely established that only minor adjustments can or should be made without the risk of major delays to the project. Nevertheless, contractors still include in their bids amounts calculated to cover risks which they expect to encounter because of changes required to meet the existing conditions with respect to excavation balances."

Disturbed by the substantial number of claims currently being filed against the state is prompting New York officials to seriously consider adopting the "changed conditions" clause contained in Federal Highway contracts. Some of the benefits they foresee would be:

- Designs would necessarily have to be much more complete. This in

Fears of Labor Complications Subside

- *Anticipated labor difficulties* stemming from application of the federal Davis-Bacon Act have failed to materialize, state highway official: at the AASHTO convention concluded after a brief discussion of the subject.

"The whole procedure is working a lot better than many of us thought it would," reported L. N. Ress, chairman of the association's Committee on Construction.

Only a few hands went up when BPR official G. M. Williams asked if there was any interest in a survey of the effect of the federal labor law on highway costs. Other highlights of this discussion:

- J. D. McMahan, South Carolina state highway engineer, credited contractors with assistance in es-

tablishing prevailing area wage rates in his state. "The local contractor association has been very cooperative," he said.

- Several department representatives reported they had occasionally encountered difficulty in obtaining determinations promptly.

- The AGC may attempt to design a standard payroll form for the use of contractors in filing these required records.

- The AFL-CIO is expected to seek federal legislation guaranteeing some provision for fringe benefits on highway work.

- Only 10 objections, out of 2,200 wage determinations made thus far for Interstate projects, have been made by labor unions.

turn, would eliminate the dangers of overdesign, and the job would more accurately reflect a true estimated cost.

- It would permit a much more accurate computation as to the State's ultimate cost on any given construction project.

- It would be expected that bids would be substantially lower because the risk feature would be substantially lessened or almost entirely eliminated. This reduction would more than offset the cost of subsurface explorations which would be required.

- The time required for subsurface exploration would not unduly delay construction progress and that designs based on accurate, pinpointed data can be completed in less time than designs which include speculation.

"There are other beneficial aspects which would also seem assured by the adoption of this clause," Mr. Corwin noted. "For example, supervisory costs could be lessened by the absence of unexpected conditions which normally arise under existing practice and the necessity for belated tests—with their delays to construction.

"Of course there will be exceptions," he said. "We realize that situations will be encountered on the job which neither the design engineer nor the contractor could possibly foresee.

"We recently encountered one such situation in the course of construction in a swamp and swale

area. During the course of normal excavation, large tree trunks were encountered—many of these had been buried by natural drainage and erosion many years before the highway construction was contemplated. When these obstructions were encountered, the contractor immediately sought relief. He argued—and not without justification, I think most will agree—that he was not expected to know the history of the territory so as to be put on notice that such subsurface conditions existed.

"But argument or no argument, and in spite of the fact that he was contractually obligated to continue construction work at his bid price—quantities of the items were increased for the removal of unsuitable material—and the engineers in charge of the job recognized that the contractor was inadequately paid.

"This is the kind of situation we would like to avoid. It leaves much to be desired, it opens the door to a type of negotiation that is basically unsound and one that should be avoided if at all possible. Here the use of a 'changed conditions' clause would have enabled the State to act within the contract, and to recognize the inconsistency in the work as it affected the contractor. Moreover, such a clause would furnish a certain amount of flexibility; permitting a thorough review of design data and making possible a means of obtaining desirable design

(Continued on page 85)

Electric controls speed work-motion of Tournapulls. 210 hp, 18-yd. "C" shown, is controlled by fingertip switches on dashboard. Simple, weatherproof motors give split-second response in powering apron-lift, tailgate motion, bowl-hoist, and steer. World-wide use over many years proves electric controls easiest to use and to maintain, fastest acting.



When is the best time to replace an earthmover?

There's a new standard, in earthmoving, for deciding when a machine needs replacement. Years ago, you remember, you were guided mainly by maintenance cost. If repair bills on any rig got out of hand, out it went. But that was when jobs were smaller, profit margins bigger: when *production* wasn't so all-important. Today, smart operators judge the obsolescence of a machine not so much by what it costs to *maintain*, but by what it can or cannot do in the way of *production*.

A loser... yet still in "good shape"

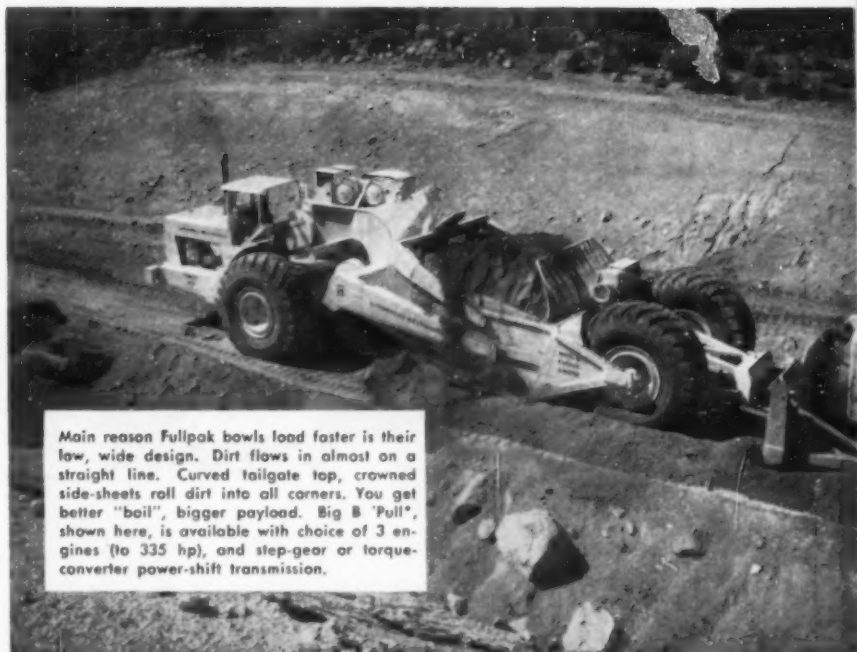
That's why, nowadays, a scraper can be a liability and ripe for replacement even though it still functions smoothly. Cost-conscious contractors realize that no matter *how* maintenance-free a scraper, if it's not moving maximum yardage, at *lowest-net-cost-per-yard*, it's just too expensive.

Consider, for instance, an imaginary project in which a scraper is completing a load-haul-and-spread cycle in 5.55 minutes... for 9 cycles every 50-minute hour. Assume, too, that it averages 11 pay-yards each trip. You're moving 99 yards an hour with that scraper... and if you've bid your job right, you're probably making money.

Compare with bigger, speedier unit

Now, however, look at what a scraper that loads, hauls, and spreads *faster*... and that has a bigger payload capacity... can do. If it knocks off just a half minute per cycle, it will complete 9.9 cycles an hour. And if it also packs in just 2 more yards per load, you're moving not 99 yards an hour, but 128.7. At the national average rate of about 40¢ a yard, you'd be earning \$11.88 more per scraper per hour!

Project those figures, and each of your faster, bigger scrapers would be earning for you \$118 more every 10-hour day... \$649 more every 5½-day week. In other words, the smaller, slower, old-fashioned scraper is *costing* you \$649 a week to keep on the line! Not



Main reason Fullpak bowls load faster is their low, wide design. Dirt flows in almost on a straight line. Curved tailgate top, crowned side-sheets roll dirt into all corners. You get better "bowl", bigger payload. Big B "Pull", shown here, is available with choice of 3 engines (to 335 hp), and step-gear or torque-converter power-shift transmission.

in maintenance costs... not in ownership or operating costs... but in reduced income *potential*.

That's the kind of scraper that needs replacing — no matter *what* shape it's in.

Move more yards faster...

That's why fast-traveling Tournapulls®, with easy-loading big-capacity Fullpak® scrapers, are replacing so many earthmoving tools... both old and new... around the nation. Tournapulls will *not*, of course, move 128.7 yds. an hour on every job, in every condition — the figures quoted above are based on a hypothetical situation — but what they *will* do, on every job, is to move *more yards faster*... at the *lowest-net-cost-per-yard*.

Ask for full details, and a demonstration of Tournapull... available in 9, 18, and 27-yd. heaped capacities.



"Handyman" scraper of Tournapull line is 138 hp, 9-yd. "D". Like all "Pulls", it has exclusive power-transfer differential, to keep you working in mud and slippery conditions. When one wheel starts to slip, this differential transfers torque-power to wheel on solid footing, keeps you moving. With 90° kingpin steer, you can "duck walk" out of trouble, too... turning prime-mover side to side until you're on good footing again. *Trademark P-1732-DC-1

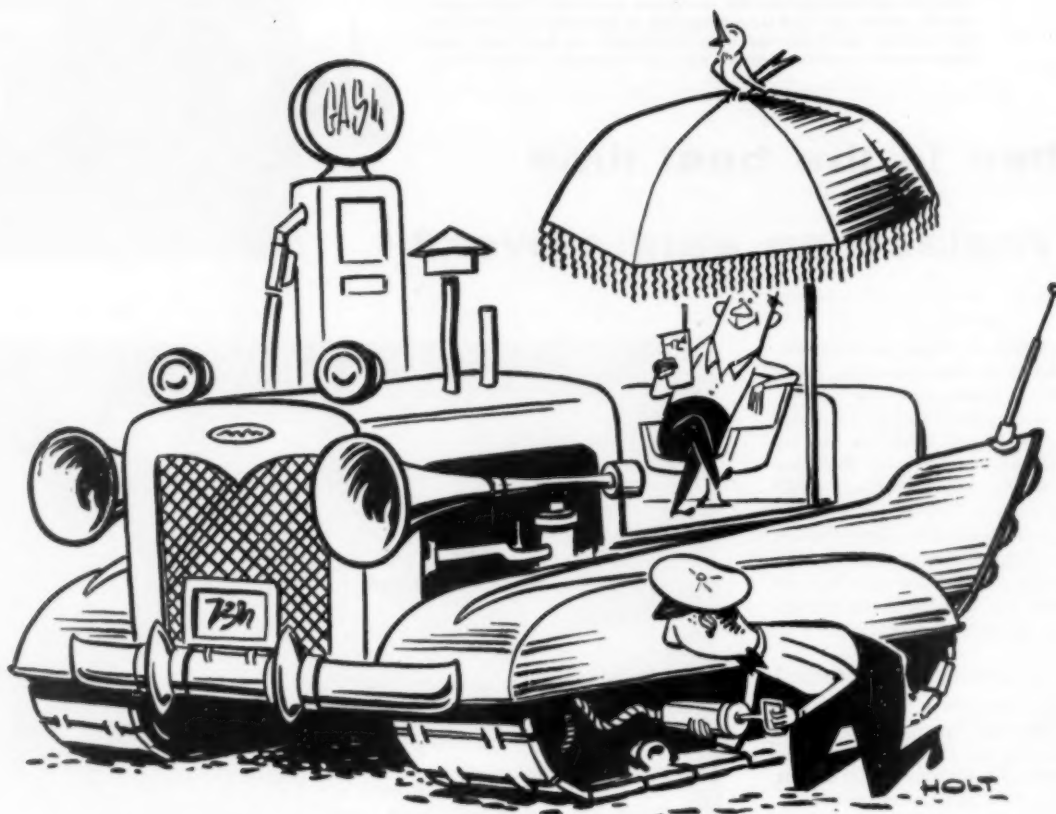


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A Subsidiary of Westinghouse Air Brake Company

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Why use automobile grease in heavy-duty equipment?

Let's not kid ourselves about the difference between the lubrication requirements of automobiles and heavy-duty machinery. D-A Lubricants are compounded specifically for heavy-duty equipment. There is a right one for every application.

For example, D-A Track Roller Lubricant • D-A Winter Track Roller Lubricant • D-A Open Gear • D-A Torque Fluid • D-A Lithium, Extra-Heavy • D-A Transmission Lubricants • D-A Gun Greases.

Let your D-A Representative give you all the facts on how D-A Lubricants can reduce parts wear and minimize downtime . . . *increase the return on your equipment investment.*

D-A Lubricants make equipment last longer



D-A LUBRICANT COMPANY, INC. • Indianapolis 23, Indiana

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CALIFORNIA—Near Culver City this 30-B Transit Crane handles 48-in. ID concrete pipe for a new water line. The 7-mile system is being constructed to carry Colorado River water to Culver City. Work is maintained at a steady clip despite heavy traffic along a route that includes 14 tunnels from 40 to 300 feet in length. Working with the 30-B are a Bucyrus-Erie 22-B equipped with clamshell and Bucyrus-Erie 38-B hoist.

These Contractors Are Using 30-Bs to Turn Jobs into Profits...You Can Too!



More and more contractors throughout the country are making money with new Bucyrus-Erie 30-Bs on their jobs. These men profit from the 30-B's air controls for smooth, big output working cycles; easy servicing and automatic lubrication of many parts that provides more working time; large, cool running clutches and brakes that mean constant response to coordinate every machine function.

You, too, can turn jobs into profits with one of these machines, or any other size in $\frac{3}{4}$ - through 4-yd. range. Ask your local Bucyrus-Erie distributor for details.

450E58C



A Familiar Sign at Scenes of Progress

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

VIRGINIA—The owner liked the performance, economy, and dependability of his 22-B shovel so well that he decided to buy this 30-B dragline. He uses the new machine to remove overburden of dirt from a sand and gravel deposit near Annadale, Va. The dragline also loads sand and gravel into trucks for hauling to road and parking lot construction sites.

MINNESOTA—Equipped with 70-ft. boom, this 30-B dragline excavates in the yard of a paper company in Brainerd. This machine removes sand and clay for the installation of new papermaking equipment. The 30-B was also used to set steel on new plant construction.

WASHINGTON—This 30-B hoe does double duty for its owner during installation of a 15,000-ft. water line for the city of Tacoma. After digging a section of 5-ft. deep trench—and without any change of front ends—the 30-B lowers a section of pipe into the excavation. Trenching is through hard pan, rock, and clay. Not shown but working on the same job is a Bucyrus-Erie 38-B hoe.

CONNECTICUT—Teamed up with a Bucyrus-Erie 22-B shovel, this 30-B dragline dredges sand and gravel to create a 7-acre lake for a housing project near Norwalk. This lake, a narrow stream before the project started, has been enlarged by the removal of over 100,000 yards of material. As the 30-B spoils the material, the 22-B loads it to trucks for removal to another location, where it is stockpiled for use on the owner's other contracts.





Truck-mounted A-W Hydraulic Crane Equipped with 1/2-yd. concrete bucket shown working on job for Western Gravel Co.

A-W Hydraulic Crane shows versatility at Western Gravel Co. plant

Western Gravel Company, Campbell, Calif., produces rock, sand and gravel and also sells Redi-mix concrete, made in two fully automatic batch plants. More than a year ago, this company bought an Austin-Western Hydraulic Crane unit for work in its own yard and to rent to customers. Mounted on a 6-wheel Army truck which has a platform large enough to transport a 1/2-yd. concrete bucket or a 3/8-yd. clamshell bucket, the crane has an 18-ft. extensible boom with a 17-ft. manual extension. Four hydraulic outriggers are used to give extra stability on heavy lifts.

Saves downtime of batch plant. Western Gravel reports: "Downtime of one

of our batch plants not only costs the loss of the plant's production, but we lose the value of perhaps 10 of our Redi-mix trucks, worth \$8 an hour apiece. Not only this, but our contractor-customers may suffer because gangs on the jobs are idle and there are also equipment rental losses. These losses may easily snowball into \$300 an hour. Using the A-W, we can now change heavy motors on the plant in 30 minutes, an hour less than formerly. The value of this one hour saved might equal a month's cost of owning the A-W."

Popular with customers. "On most jobs, when a contractor rents a large

crane he has to pay the moving cost and setup time for many more hours than he pays for renting our lower-rate A-W, which goes and comes so much faster and is ready to work minutes after it arrives."

Extremely versatile. "We used the crane to assemble our second batch plant. It lifts engines out of earth-moving machines and tractors...hoists sacks of admixtures up 20 ft. to floor of batch plant... In our operation there seems to be nothing it cannot do to save time and labor in lifting things."

For the complete Western Gravel Co. story, write for Gould Certified Report No. 5601.

Austin-Western

CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes

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AASHO CONVENTION

(Continued from page 80)

features—without the need for improvisation on the site in the face of an urgent time element."

"Critics claim the cost of extensive subsurface investigation would be substantial, and in some instances, it might even require a delay in seeking bids for the contract, Mr. Corwin said.

Critics claim the cost of extending costs would be extraordinarily high because of design accuracy which would be required. On the other hand, it has been alleged with equal force that much time will be saved in preparing the design because the design engineer will have dependable and sound data from which to work. Certainly, an additional benefit could be expected in that supervisory costs to the State would be greatly reduced with work schedules more precise and less subject to delay.

"Any discussion of this all-important subject must consider situations where the subsurface conditions encountered are not at variance with the assumed and anticipated conditions and in which the engineer recommends that the excavation should be made at a lower elevation. It is not unusual to require this type of change because of seasonal variations of ground waters. The unit bid price would probably not be sufficient to cover the secondary cut. In this event, we would have a 'changed condition' and it would have to be acknowledged and met.

"Constant review of our construction contracts is a necessary operation," Mr. Corwin reminded his hearers. "Some of our contracts contain features which originated at the time of the construction of the Erie Canal in 1824. Many changes, of course, have been made since then, and we can easily appreciate that there will be many made in the future to accommodate the conditions of modern highway design and construction. This is particularly true in view of the fact that many of our highways which today are being constructed with Federal aid require Federal approval before such construction contract can be progressed.

"We cannot, personally, escape the conclusion that proper analysis in the first instance is a far sounder, saner and wiser approach than arbitration, compromise or trial at a later date."

More Convention Notes from AASHO Committee Sessions

• **Job Programming.** At a construction committee session R. W. Rice, Michigan state highway department, outlined the steps of planning and scheduling a complex urban road project involving many contract sections. A lot must take place before such a project can start, he reminded listeners. Beginning with an over-all area plan, the first procedure in the Detroit environs is to select the highest-priority project, and program annual construction within the range of anticipated funds. "Precising" or final location is a time-consuming step (as long as five years) for considering alternate routes and costs and securing approval of all local interests. The state engineers, this speaker said, often have had little idea in the past of the time such advance effort must take.

In Detroit these considerations have been handled under a general committee with federal, state, county and city representation. The committee has gone into every phase: right-of-way, interchange locations, design, traffic, construction, maintenance, landscaping, and signing. A subcommittee of traffic engineers made sign recommendations for ramps and interchange approaches, going so far frequently as to suggest structure changes to make room for proper location of signs.

Next comes the detailed design and preparation of construction plans. About this time right-of-way acquisition may rear its head as an indefinite timing element. Finally, actual construction is programmed, and the work cut up into concrete units (usually under \$2 million).

Construction is divided into three phases:

1. Relocation of utilities, which may take as much as 25 percent of the job cost, and must be worked out with the various utility companies involved.

2. Appurtenances, such as service roads are constructed next, to handle traffic during construction of the main roadway (which is usually Depressed in Detroit), and afford access to the contractors for the main job.

3. Finally, the expressway proper is awarded in sections broken up according to geographical and other considerations, with separate contracts often for special structures, storm sewers, interchanges, etc. Paving is also awarded separately in segments.

A sequence of construction operations is then set up, with thought to traffic handling, detours, cooperation of police, utilities and other agencies. The 5.5-mile segment of freeway used by Mr. Rice as his illustration was handled under forty contracts totaling \$28 million.

At another construction committee session, J. W. Trask, California division of highways outlined experiences in his state's effort to reduce delays and costs in public utility changes, through advance planning and job coordination. He noted that there is an element of risk in planning too far ahead of construction, since a city's needs may change rapidly and design standards are also evolving. Land use is one important factor of swift change.

Utility companies should be given as much time as possible to make relocations, said Trask. These companies have their own scheduling problems, whether the work is done by contract or company forces. In weighing costs, both the direct cost of the changes, and the indirect costs of alternate schemes to the highway user, should be considered.

In California each highway district engineer is responsible for a 5-year planning program, based on anticipated revenues, utility costs are considered along with other elements. While there will inevitably be some off-hour or premium-pay work in utility relocation, these extra job costs can be reduced by looking well ahead. Also the rebates to contractors for job delays due to utility problems can be thus minimized.

• **Induction Radio.** A new development holding much promise in the control of traffic along urban expressways was described at the AASHO traffic session by Dr. T. F.

Jones, Jr., of General Electronics Laboratories, Inc. This is induction radio, which works through a cable buried along the pavement edge to instruct the driver through his car radio in event of emergency. The scheme involves a power level high enough to contact vehicles using a segment of highway and approaches to interchanges, but weak enough to not cause interference problems with other local broadcast bands.

The systems as now developed could be installed in 3 to 5 mile zones under FCC's low power rule, said Dr. Jones. Police could read brief messages into a recorder for automatic repeat transmission, instructing drivers in case of a traffic pile-up or other emergency.

• *Get Ample Right-of-Way.* At one of the AASHO traffic committee sessions George F. Hagenauer, chairman of the Chicago Metropolitan Area Expressway System traffic subcommittee, linked right-of-way to the problems of operating an expressway after it is built. "Once an expressway is constructed, you've had it," he warned. The design must be thought out thoroughly with reference to traffic problems. In particular, plenty of land area must be acquired at the outset, to protect against undesirable encroachments at interchanges, this speaker admonished.

• *Traffic vs. Design.* Shoulder design needs new attention as another element of expressway geometrics, said this speaker. Refuge width is vitally necessary for tire changes and other emergencies, and such shoulders along areas of high-speed traffic should be designed as acceleration and deceleration lanes, for safety. Also desired is a different texture, to alert the dozing driver who has started to leave the pavement.

On the subject of how many lanes to provide, he advocated delaying the addition of a third lane in each roadway in areas where local citizens haven't had experience with the new high-speed facilities. It takes time for motorists to get accustomed to the best expressway design, and three lanes often involve a problem of controlling weaving and developing effective signing for steering drivers into the proper lane as they approach ramp exits.

Finally, Mr. Hagenauer noted that designers often are still thinking in static terms. The traffic engineer has led in thinking of traffic dynamics. In this connection he took a parting shot at designers who provide a wide right-of-way, then

Stimulating Right-of-Way Sessions

• *Right-of-way* committee meetings drew sizable audiences at the AASHO meeting. Specialists in this operation exhibited strong concern that fair prices be paid to landowners whose property had to be acquired for highway improvements. An Ohio department spokesman declared that their state obtains three appraisals and the top figure is arbitrarily chosen as the basis for negotiation. It is the state's rigid policy to eschew "horse trading."

"We go in with one price—and that's it," declared the agent.

Frank C. Balfour, California official and dean of the right-of-way fraternity, argued for the same attitude. "A right-of-way man must be prepared to sell an owner on the benefits of the project," Mr. Balfour stressed, which means that, among other things, he must be prepared to:

- Give the owner all the facts in the case.
- Describe convincingly why the highway must go through this owner's land instead of his neighbor's.
- Outline the methods used to arrive at the appraised price of the land in question.

• Insist that he will not "horse trade" or haggle.

"Furthermore, a man will be fired from our department as quick as you can say 'Jack Spratt,' if he ever holds the threat of condemnation over a property owner's head."

(California negotiates 98½ percent of its right-of-way takings.)

David Levin, the BPR's land use expert, told the committee that 30 land economic studies are under way now in 20 different states. These projects will provide right-of-way experts with a surge of information about the benefits created by new highways that should make acquisition considerably easier, he predicted.

"Some of the finest minds in the country are concentrating on this endeavor," he noted.

A Florida delegate announced that the law there requires the state to pay for legal counsel representing property owners in right-of-way cases. The State is faced with attorneys who have gone up and down the proposed route lining up clients. The result is higher acquisition costs and more cases landing in the courts.

use an excessive amount of the total width for grassed roadside and not enough for safe shoulders and median space to aid distressed drivers. He showed slides picturing examples of roads which have guard rails hugging too close to the pavement edge, with large areas on the far side going to waste, safety-wise.

And he used a telling point to condemn the use of too-narrow medians, in observing that such medians force high-speed traffic to operate at night on the low-beam to avoid glare. High-beam driving is essential for safety at night under top road speeds.

The complicated interchanges now on the design boards, said Hagenauer, cannot be seen from the air by the approaching driver. He judges them entirely by the signs and markers—these must do the whole job. Refinements in profile and other design elements, as well as of signing, are needed to give the driver a sure decision and a safe passage through the maze . . . The 41,000-mile Interstate system, he

declared, will have to "operate largely by itself," and this point of view is a good one for the designer always to keep in mind.

• *Electronic Auto Control.* An AASHO committee recommended that a \$200,000 research project be launched to determine the feasibility of electronically controlling automobiles. There has been increasing talk of such developments in the automotive industry. The highway men would like to build a two-lane experimental highway with built-in electronic devices. Among other things, they would explore the possibilities in:

- Instruments to actually control the automobile, accelerating, braking and steering it, in response to external traffic conditions.
- A device to keep the driver continually informed of traffic conditions around him by radio messages.
- Electronic devices to "sense" passage of vehicles, useful for traffic counting, actuating traffic signals and actuating warning lights approaching and following vehicles.

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time for
soil-cement...**



Spring break-ups make driving hazardous on roads like this.



On the job the year around. A Louisiana soil-cement road.

75% of your materials are free with soil-cement, the 20-year-plus pavement

You save money right from the word go. You work with what you've got—soil and rubble in the old road.

Any gravel or blacktop left on the old road? Mix it with portland cement and whatever soil is at hand... give it a thin bituminous topping.

Modern soil-cement can be made with practically any kind of soil—or the broken-up surface of the old road. It gives you *lasting* precision-built roads instead of upkeep headaches. And the job can be done in most cases with equipment already on hand... and fast, new machines are now available.

You get a pavement that will last 20 years and more! For soil-cement grows stronger year by year. Core tests prove it. *It's stronger inch for inch than any other paving material short of concrete.* Loading tests have shown it can carry twice the load of crushed limestone base... three times that of gravelly clay.

And soil-cement has beam strength... spreads the load over wide areas of the subgrade. No potholes, no washboarding, no raveled edges. That's why engineers are converting more mileage to low-cost soil-cement every year. Write for booklet, "Soil-Cement Pavement."

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AIRPORTS • PARKING LOTS**

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J. C. Lavender, project superintendent for Craggs Construction Company.

"OUR ALLIS-CHALMERS



Forty Five motor grader puts finishing grade on roadbed. Notice how the ROLL-AWAY moldboard keeps load live and rolling.

Big, powerful HD-21's clear right-of-way and level fill. Torque converter drive makes big production easy for operator . . . easy on tractor and equipment.



FLEET HELPS US BID LOW

...finish the work on schedule"

... that's what J. C. Lavender, superintendent for the Craggs Construction Company, Ocala and Gainesville, Florida, says about his company's Allis-Chalmers fleet.

Craggs Construction Company was awarded a 14½-mile job on Florida State Route 207, an important farm-to-market road in the heart of the potato growing area. The contract called for widening, filling, straightening out several sharp curves, and constructing a large number of drainage ditches.

Here are the Allis-Chalmers machines that did the bulk of the work: 4 motor scrapers, 4 motor wagons, 13 crawler tractors, 4 pull-type scrapers, 5 motor graders.

This Allis-Chalmers fleet moved approximately ½ million cubic yards of material from 5 borrow pits for filling and stabilizing. Almost 200 acres of land were cleared and grubbed by bulldozers as the right-of-way was widened to accommodate a 24-foot pavement with 8-foot shoulders.

Whenever you have to move dirt in a hurry — on large jobs or small — investigate the many reasons for going Allis-Chalmers. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

Engineering in Action

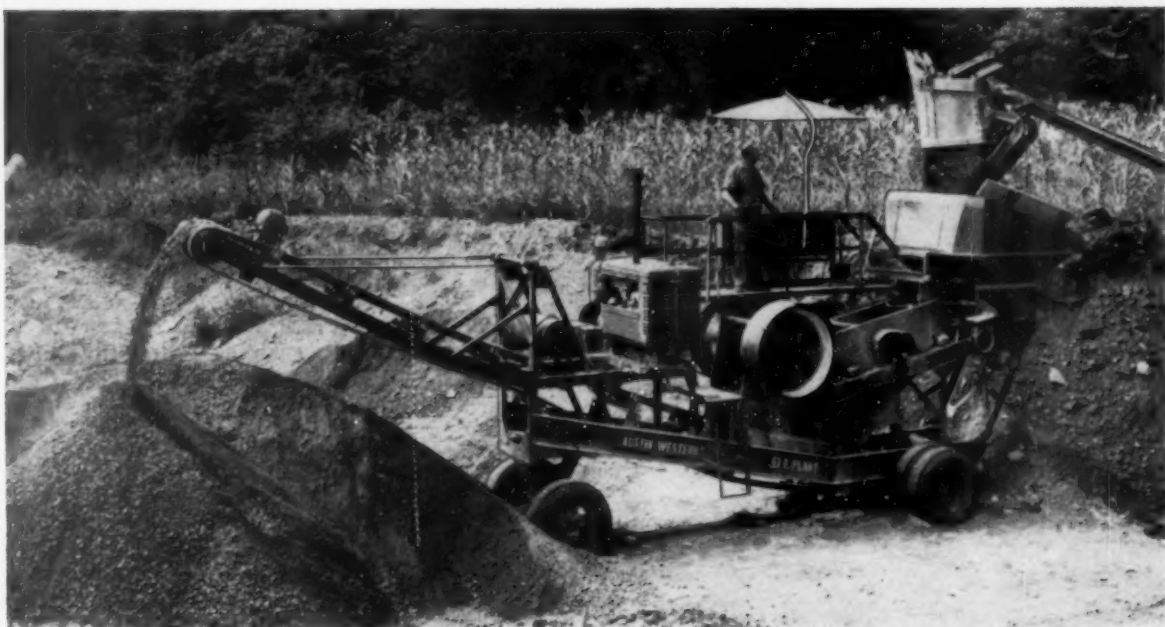
ROLL-AWAY is an Allis-Chalmers trademark.

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Forward forced ejection and high apron opening provide fast, clean, unobstructed dump and smooth, controlled spread. This keeps fill area in good operating condition ... contributes to better compaction.

Curved cutting edge and offset center bit of Allis-Chalmers motor scrapers mean no corner voids... a full payload every trip.





Lima Austin-Western 61-E portable diesel-electric plant equipped with 10" x 24" Roller Bearing Jaw Crusher and 2' x 6' double deck Gyrating Screen. A complete single-pass crushing and screening unit that can move in and out of a job in a minimum of time.

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Portable plants are designed for fast moves and easy setups. Weight is distributed to meet most state highway limitations. One-man operation reduces the cost per ton. Their wide range of adjustment makes it simple to meet rigid specifications.

The Lima Austin-Western line includes jaw and roll crushers in many sizes, plus matching screens, elevators, conveyors and bins. Call on your nearest distributor for full information. Or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.



Lima Austin-Western stationary crushing plant producing washed sand and three sizes of specification material.



Lima Austin-Western 101-S closed circuit portable crushing and screening plant; a high-output unit delivering sand and roadbase material in two sizes.

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● Caterpillar D8 tractor equipped with No. 8S bulldozer and No. 8 ripper is working on road construction job in Arvada, Colorado. Rerouting Wadsworth Avenue through and around town.

How and When to Use Your Ripper

Are you making the most of this familiar tool to speed scraper loading? Here are some pointers.

By R. H. Hunger

Tractor Development Section, Caterpillar Tractor Company

IN THE PAST FEW YEARS there has been a definite increase in the number of rippers in the field. This extra interest has, of course, brought up many questions about their use. A specific answer to each question must certainly be related to specific job conditions, but there are also some general answers or rules of thumb. These can be used to guide the man who wants to know **WHEN, WHERE and How** to use his ripper.

When to Use

The answer to this is relatively easy. Use a ripper whenever scraper loading time becomes excessive. However, defining just how much is too much load time becomes more difficult. The material, the size and horsepower of the pusher tractor and the size and horsepower of the hauling unit all have an ef-

fect on economical loading time. After checking numerous time studies made in most types of material, a scraper load time of 1 minute seems to be the maximum for a great majority of earth-moving contractors.

The accompanying graph was drawn using 1 min. as the maximum economical loading time. In some cases in which material is so hard that only a struck load can be obtained in 1 min., the advantage derived from ripping will be even greater than shown.

Costs used for 20, 40 and 60 per cent reduction in load time include

Making the Most of Modern Construction Equipment

One of a Series

the cost of owning a ripper and also a machine to do the ripping. Also, in all job studies where equipment was observed loading before and after a ripper was used, the load time was reduced appreciably more than 20 per cent. Therefore, a worth-while saving was realized.

What Material

Any material in which the scraper cutting edge has difficulty in penetrating should lead to considering the use of a ripper. This includes frozen ground, shale and reasonably soft stone. A few types of material have a characteristic which makes them the exception in this case. Some sandstones or conglomerates which completely crumble when they are ripped, load easier in the natural state. In harder rock conditions, most contractors seem to follow this rule of thumb—rip when you can and blast when you have to.

How to Rip

The desired size for broken particles will regulate ripping procedure. Pieces should be small enough so that they can be handled with relative ease by the scraper during

loading and dumping. Oversize particles tend to cause the scraper operator excessive maneuvering during his loading, and also tend to hang up the scraper bowl or cutting edge during dumping. The best balance between the amount of time spent ripping and the desired results is usually worked out experimentally on each type of material. In order to keep the operation as economical as possible, most contractors pull as many teeth as the tractor can handle and as deep as possible. This practice works very well except in a few materials where the chunks broken out are too large if full tooth penetration is used.

Equally important as the number of teeth used, is the selection of the ripper teeth. Currently there are two major types of ripper teeth offered, straight shank teeth and curved shank teeth. Early in the development of ripper shanks the theory was that the curved shank tooth was superior to the straight shank, but as the development of ripper shanks progressed the theory was reversed. According to present thinking, the straight shank tooth has several advantages over the curved shank tooth:

1. Sheds rock easily
2. Better penetration
3. Less wear (depth)
4. Wear area is larger on the curved shank
5. More versatile

One statement will summarize the advantages of the straight shank—the straight shank tooth may be used on any application that a curved shank tooth can be used, and the straight shank tooth is a more efficient ripping tool on many rock applications.

There are two types of rippers in general use today—tractor mounted and the towed. Although the tractor mounted represents great initial investment, it has several application advantages. A mounted ripper is always available when needed and with it the tractor is more maneuverable and can be used for a greater variety of jobs. Actually, this convenience has enabled owners to use their ripper tractor in many

places where it would have been extremely difficult with towed units. The pusher tractor and ripper or bulldozer and ripper combinations are the most common.

The tractor-mounted ripper has extended the range of scraper loaded material into areas formerly handled by blasting shovels and trucks. Two factors have been responsible for this increased popularity for the ripper. One, extreme maneuverability of the tractor equipped with the ripper, and second, increased penetration achieved by imposing the weight of the rear of the tractor on the ripper teeth.

Some startling cost saving results have been observed on a typical job. With a hauling distance of 1,500 ft. and a loading time in the non-rip material of 1.25 minutes, the addition of a ripper reduced the cost per cubic yard of moving the dirt 14 per cent.

Few contractors can afford to overlook a tool that will cut costs so drastically.

Publish The Estimate? State Practices Vary

The practice of publishing the engineer's estimate on highway contracts is not a uniform one between the various state highway departments. A recent review of the pol-

icies of the various states, made by the Virginia department, reveals the following:

40 states do not publish estimates prior to awarding contracts.

9 release this information in advance of lettings.

27 do not publicize estimate either before or after receiving bids.

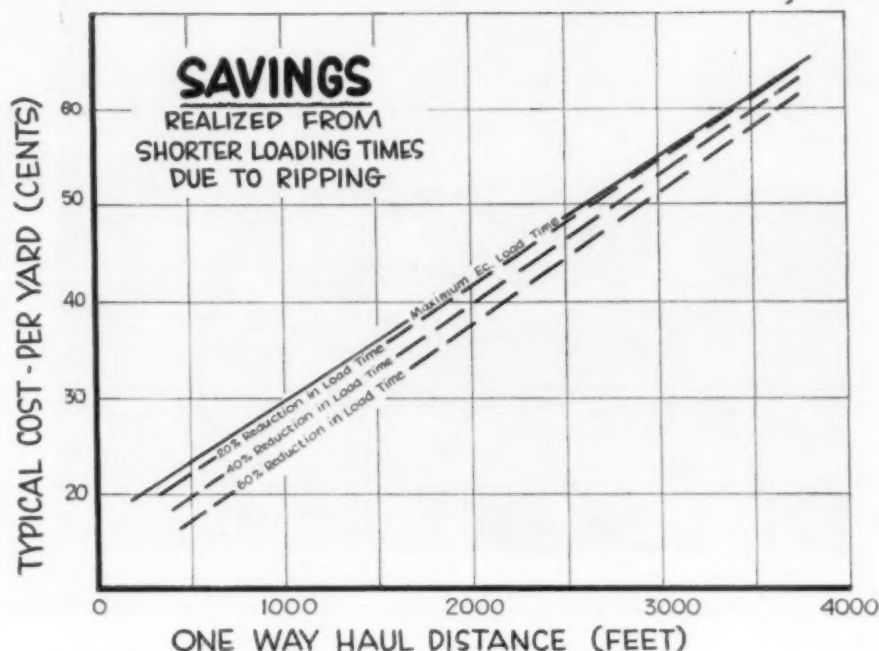
13 release the estimate after receipt of bids.

9 apparently have no fixed policy in the matter.

Safety on Kansas Turnpike

The Kansas Turnpike during its first 12 months of operation (236 miles) reports a traffic fatality rate of 3.7 per 100 million vehicle-miles. This compares with a national average of 7.3 and a figure as low as 2.0 to 2.5 for some of the eastern turnpikes.

Of the 253 accidents reported, 198 involved only one car. There were no head-on collisions. Accident reasons: slick roads 60; speeding 57; apparently asleep 43; tire failure 23; driving while intoxicated 21; following too closely or failing to reduce speed 20; improper passing 12; wind and improper hitch on towed vehicle 11; improper turn 9; inattentive driving 7; service area turns 5; hood came loose 4; animals on road 3; object striking vehicle 1.



• This chart will help you do some quick figuring on the speed-up you can realize by use of a ripper.

Move Earth at Lower Cost Than Ever Before!



JOHN DEERE 820 DIESEL TRACTOR and Hancock 8-Yard Elevating Scraper

YES, it's true! Whatever your job—performance records show that you can move more dirt faster than with any other unit of equal bowl capacity.

The John Deere "820" Diesel Tractor with its 67 engine horsepower is a proved economy leader. It pulls the 8-yard scraper for only pennies per hour.

Independent "live" PTO drives the scraper elevator to lift the dirt from the blade into the bowl—the big reason why you move more dirt with less horsepower. There's no need for expensive auxiliary pusher power.

Two hydraulic circuits are used—one to raise and lower the blade, the other for dumping and spreading. A low-cost, heavy-duty, fast-working unit you will want to investigate. See your John Deere industrial dealer.

**"We Load,
Elevate, and Spread
80 to 150 Yards
per Hour"**



My business is moving dirt, mostly in highway construction. The John Deere Tractor and latest Hancock industrial scraper opened our eyes to what we believe to be the ultimate in loading, elevating, and spreading dirt. We have worked in everything from blown sand to what have you. I heartily recommend this advanced designed equipment to any contractor or individual with a dirt-moving problem.

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ROADS AND STREETS, February, 1958

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On the ILLINOIS TOLL ROAD...

**"Eucs" outnumber*
rubber tired**

* Euclid "Twin" Scrapers—42 of them—are proving that they move the cheapest dirt on all lengths of haul and under every job condition.



"Euc" Loaders and Bottom-Dumps are being used by several contractors on the Illinois Toll Road—they're a "natural" where big yardage must be moved in a hurry.

With a heaped capacity of 32 yds. and a total of 518 h.p., the TS-24 Euclid "Twin" outproduces any other scraper—moves more yardage at lower cost and gets more work done faster.



SUCCESSFUL BIDDERS FIGURE ON "EUCS"



Over 200 Euclid Scrapers, Bottom-Dumps and Rear-Dumps . . . plus 16 big TC-12 "Twin" Crawlers . . . are already on this "Road Show".

all competitive equipment combined

THERE'S keen competition among contractors for highway work — that's why you'll find Euclid earthmovers the outstanding equipment choice on jobs like the Illinois Toll Road. With their low cost, high production performance, "Eucs" provide a bidding advantage as well as protection for the contractor's profit margin. In spite of delays by weather and tough working conditions, over 225 "Eucs"—scrapers, bottom-dumps, rear-dumps and crawlers—are piling up yardage to help get the earthmoving done on schedule.

The performance of Euclid equipment on the Illinois Toll Road, as on most other major earthmoving projects in the last 20 years, is one of the many reasons why owners say from experience *Euclids are your best investment.*

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

**These contractors*—big and small
—are using "Eucs" to make the
dirt fly on the Illinois Toll Road:**

Arcole Midwest Corporation
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Kluck Construction Company
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McCarthy, Mass & Dillon
Ralph Myers Contracting Corp.
O'Neil and Winkelman
Orr Construction Co.
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Ryan Construction Co.
Western Contracting Corp.
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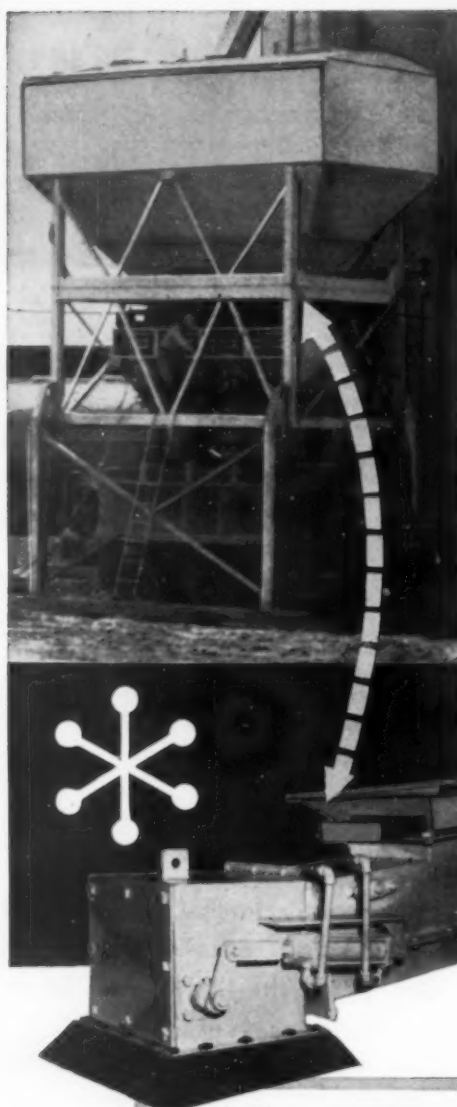
* As of August 1, 1957



Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE





Convey your cement
on a trouble-free
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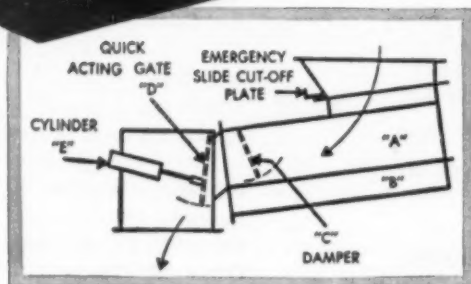
The new **BUTLER** **Airflomatic*** **Cement Feeder**

REPLACES your present cement feeding system with the *positive*, efficient, new **BUTLER Airflomatic**. No bolts or drives to shear. No pins to shear. No clutches to slip. No moving parts except a stream of air. You have *precision* feeding at all times — day in and day out. No down-time because of feeder trouble.

Cement literally rides on a cushion of low pressure, large volume air provided by a blower attached to the batcher platform. The blower also *aerates and fluffs* the cement in the *over-head bin* far more effectively than a costly compressor. No jets for additional air are required. Having extensively field tested the Airflomatic Feeder, **BUTLER** now makes it standard equipment on the sensational TX-4 Road-builders and the Ready-Mixed Plants.

BUTLER offers the *Airflomatic Cement Feeder* for installation on all batching plants regardless of the make. The Airflomatic is simple and easy to install wherever a vane feeder has been used.

Write to **BUTLER BIN COMPANY** for complete information and prices. Use the coupon if it is more convenient. Just a postcard will do, if you prefer.



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Please send full description and prices of the
BUTLER AIRFLOMATIC Cement Feeder.

We now have a Ready-Mixed Plant ☐ Highway Batching Plant ☐ manufactured by.....

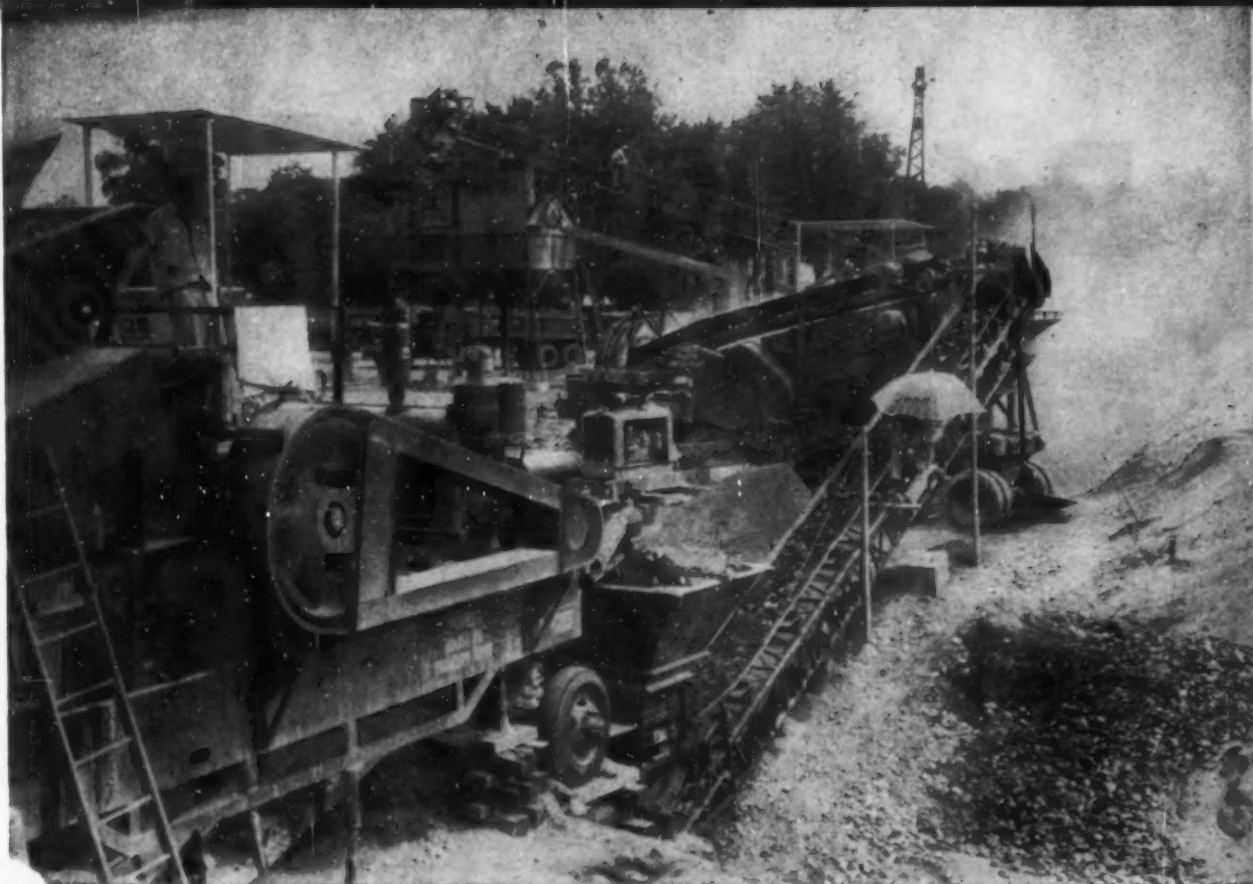
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Company

Street

CityState

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● Looking across a section of the plant leading to the washing section.

Portable Units Do Stationary Job

Details of an assembly of rubber-tired aggregate production units designed specially for simultaneously converting the run of a boulder-strewn glacial pit into concrete sand and stone and material for armored shoulders.

A MICHIGAN aggregate contractor, faced with producing washed concrete materials at speeds up to 140 tph, has solved his problem successfully by grouping several portable units to do a finished job. As a result, a hard glacial deposit is being processed easily. Boulders up to 15 in. in diameter make no difficulty at the head of the system. Washed sand is produced as planned at the tail end of the line. And everything is functioning smoothly in between.

The contractor is Pickitt & Schreur, of Allegan, Mich., specialists in the production of rock and gravel products. With roadbuilding volume in Michigan ever on the increase, the company now is working year 'round to stay ahead of

plant demands. The plant here described is only a part of the company's extensive facilities.

The production site is a glacial deposit about 12 miles east of Ionia, in Michigan's lower peninsula. One of the few acceptable sites for washed aggregates in a 50-mile radius, this site has supplied various concrete paving jobs for the Michigan state highway department. Recently under construction are projects on U.S. 27 by Sargent Construction Company, and one on U.S. 16 by Carl Goodwin & Son. In addition, Pickitt & Schreur's plant has shipped a sizable percentage of its output by truck to Lansing for rehabilitation of airport runway and apron pavements.

Two sizes of rock aggregate, in

addition to sand, are being produced as washed products. Also stone chips for armor coat surfacing of the bituminous shoulders. It was the chip item which influenced Pickitt & Schreur to buy the high capacity portable Pioneer 45-VE Duplex, and place it with other units.

By having the 45-VE in its flow plan, the company can produce sand, both sizes of aggregate and the chip size simultaneously. Chip production is expected to be handled, particularly in the later job stages.

Plant components have been picked with care to solve all the problems posed by the pit's characteristics. Since the pit runs heavy
(Continued on page 126)

Big new FORD

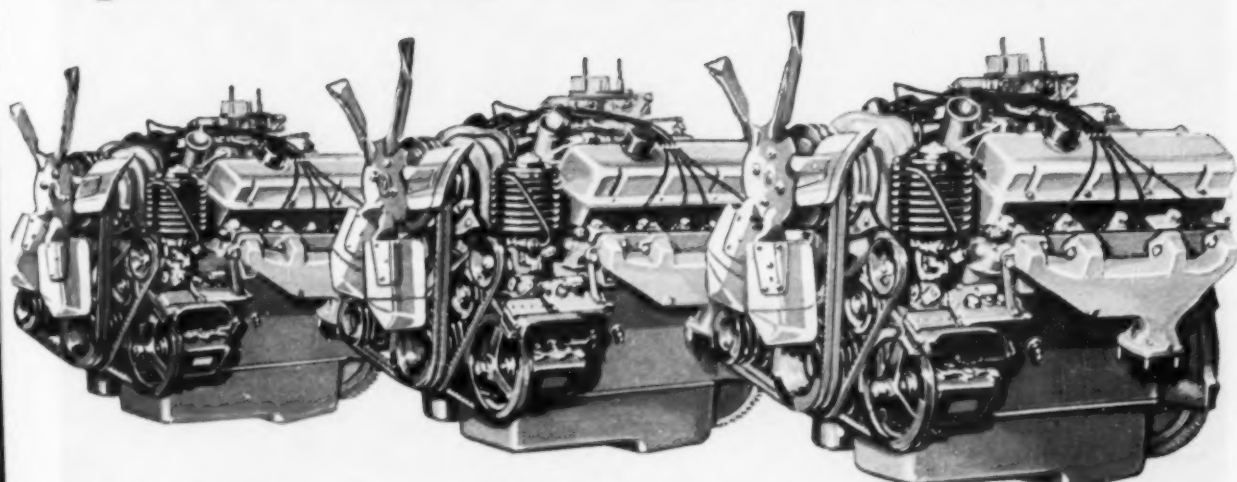
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NEW SUPER DUTY V-8 FEATURES

- Gross horsepower up to 277
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- Modern Short Stroke design
- Three-stage cooling system
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- Stress-relieved blocks and heads
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super duty V-8's up to 534 cu. inches!



401-cu. in. Ford V-8

Maximum horsepower—226.

Torque: 350 lbs-ft @ 1800 to 2300 rpm.

477-cu. in. Ford V-8

Maximum horsepower—260.

Torque: 430 lbs-ft @ 1800 to 2300 rpm.

534-cu. in. Ford V-8

Maximum horsepower—277.

Torque: 490 lbs-ft @ 1800 to 2300 rpm.

10 BIG NEW EXTRA-HEAVY TRUCK SERIES

GVW's up to 51,000 lb. For '58, ten new basic series are added to Ford's already extensive Heavy and Extra Heavy Duty line. Four new Tilt Cabs, four new Conventionals, and two new Tandem models offer GVW ratings up to 51,000 lb.

GCW's up to 75,000 lb. New T-950 Tandem is rated for 75,000-lb. GCW. Biggest single-rear-axle models are rated for 65,000-lb. GCW.

Front-axle capacities up to 15,000 lb. Choice of three front axles in most new Ford Extra Heavies. Rated capacities of 9,000, 11,000 and 15,000 lb.

Rear-axle capacities up to 29,000 lb. Wide choice of rear axles includes single-speed and two-speed, single reduction and double reduction types. Capacities range from 18,000 lb. to 29,000 lb.

Bogie-axle capacities up to 38,000 lb. For '58 there are five Ford basic tandem axle models. Biggest of the five is the brand-new T-950 which features a tandem rear-axle assembly rated for 38,000 lb. Other bogie-axle capacities range down to 22,000 lb. for Ford Series T-700.

New transmissions. Roadranger transmission available in all ten new Ford Heavies. Up to 33% less shifting. Engines operate in peak horsepower range, use less fuel. "Short Fourth" transmissions also available on "F" and "C" Series.

FORD TRUCKS COST LESS

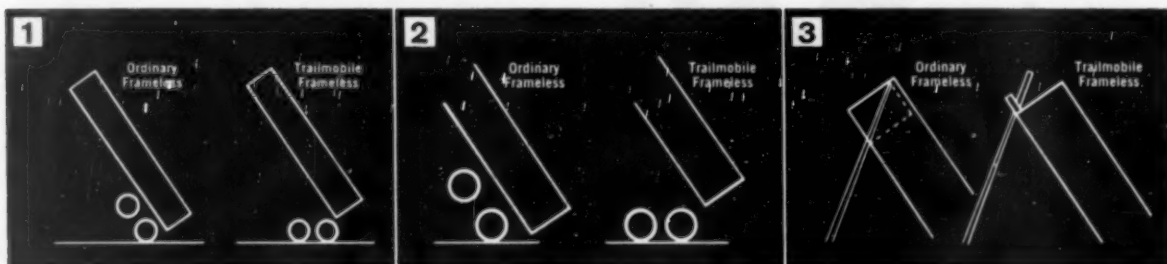
LESS TO OWN... LESS TO RUN... LAST LONGER, TOO!

... for more details circle 271 on enclosed return postal card

ROADS AND STREETS, February, 1958

NEW TRAILMOBILE FRAMELESS DUMP TRAILER

allows up to 3000 lbs. extra payload • offers five unbeatable features



1 **More stability**—Both axles, all 8 wheels, stay on the ground throughout dumping cycle, whether spreading or stockpiling.

2 **Better stockpiling**—Spill point remains 43 1/4" high while piling—almost double that of ordinary frameless dumps.

3 **Extra cube**—Newly patented bail eliminates space consuming doghouse... lowers lift point for added stability.



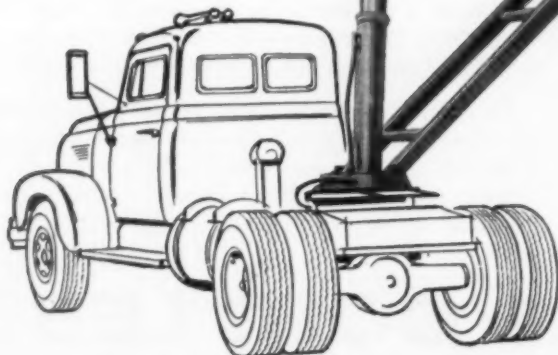
4 **More loading capacity**—With a full 88" inside width, you get more payload capacity in a Trailmobile frameless dump trailer.

5 **No debris deposits**—Trailmobile frameless body stays clean because sloped runningboards throw off dirt and debris.

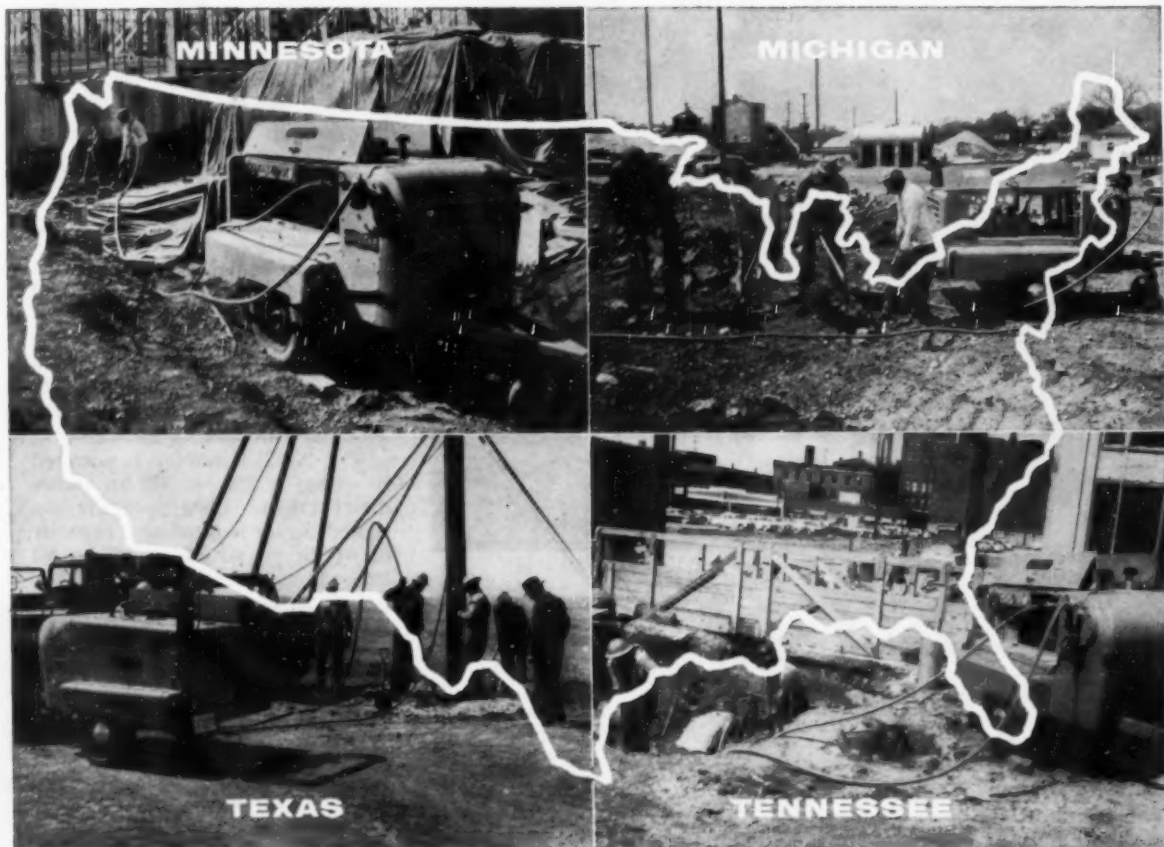
Call your Trailmobile representative now for full details on this new, highly competitive entrant in the construction market—the Trailmobile Frameless Dump Trailer furnished with the matchless Trailmobile Tandem.

TRAILMOBILE INC.

TR-666



CINCINNATI 9, OHIO • LONGVIEW, TEXAS • SPRINGFIELD, MISSOURI • BERKELEY 10, CALIFORNIA
... for more details circle 324 on enclosed return postal card



JOY 125 cfm **AIRVANE** ROTARY

Your dependable Portable... on the job nationwide

For the work-hard-and-move-fast jobs you need a really *reliable* portable compressor. And that means the JOY Rotary RP-125... it's proving every day, all over the country, that it can handle your jobs faster, with minimum maintenance and downtime.

RELIABILITY The Joy RP-125 gets on the job quick and *stays* with it. No complaints about the weather—hot or cold. This rugged machine was designed and built to supply air dependably anywhere in the country... a real heavy-duty machine that can stand up under tough service.

ECONOMY Here's a Rotary that takes the bumps, tows like a shadow and saves fuel by matching output to demand from 0 to 100% of capacity. Set the dial on

the new *Servair Demand Control*... it's simple, fool-proof... and the Joy RP-125 delivers the pressure needed. A real plus: the exclusive *Joy Thermal By-Pass Oil Circulating System* eliminates time-waste with a fast warm-up; provides warm oil at the start—no need to run the machine for several wasted minutes in cold weather.

ACCESSIBILITY Here's an attractive, clean-styled Rotary Portable that you can get at, service easily, without skinned knuckles and bruised shins.

• If you want top air-supply efficiency on your small jobs, now is the time to see the Joy RP-125. Talk to the Joy Distributor nearest you, or write to **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: **Joy Manufacturing Company (Canada) Limited, Galt, Ontario.**

WSW C6829-200



WRITE FOR
FREE BULLETIN
280-86

JOY... EQUIPMENT FOR CONSTRUCTION... FOR ALL INDUSTRY



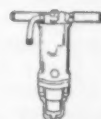
PORTABLE AIR
COMPRESSORS



WAGON
DRILLS



ROCK
BITS



HAND-HELD
ROCK DRILLS

... for more details circle 290 on enclosed return postal card
ROADS AND STREETS, February, 1958



Buckeye Farm Drainage Ditcher

Farm Drainage Ditcher

A new farm drainage ditcher, the Buckeye 302-A, features a live hydraulic digging wheel hoist and a hydraulic driven 3-speed conveyor as standard equipment.

The hydraulically operated digging wheel hoist is controlled by twin hydraulic cylinders. Two finger-tip type levers give the operator instant control of either end of the digging wheel frame, thus leaving the operator free to concentrate on the grade.

The ditcher is also equipped with a hydraulic conveyor drive, powered by a separate hydraulic motor. The drive provides three separate conveyor speeds allowing spoil to be discharged at varying distances from the ditch. The conveyor runs independent of either the digging wheel or travel speeds, and is reversible.

Maximum depth of cut for the new ditcher is 5½ ft. with width of cut from 12 to 24 in.

Gar Wood Industries, Wayne, Mich.

For more details circle 101 on
Enclosed Return Postal Card.

Mobile Power Stations

International Harvester has announced that its "Electrall" now is available for use with any make 25 hp or larger tractor. Previously this mobile power station was designed as a V-belt driven, side-mounted unit for certain International and "Farmall" tractors. Now it is available as a fast-hitch

or trailing model for tractors with A.S.A.E. std., 1½ diameter, 540 R.P.M. P.Y.O.

Electrall finds its principal use as a standby electrical power unit for emergency use on construction work when power is not available. It delivers the same alternating current as the regular high lines, at a continuous rate of 12.5 kva.

International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

For more details circle 102 on
Enclosed Return Postal Card.

Tractor-Trailer Unit

A new planetary-axle tractor and a matched bottom-dump trailer with rated capacity of 50 tons have been developed by Autocar for off-highway use in coal hauling operations.

The tractor, designated the AP-

New

Reader Service Numbers Are

25T, is the fourth model in an off-highway planetary line introduced within a year by Autocar. In developing the new unit, Autocar has taken advantage of the advanced engineering features of the AP-25 truck and adapted them to tractor-and-trailer design.

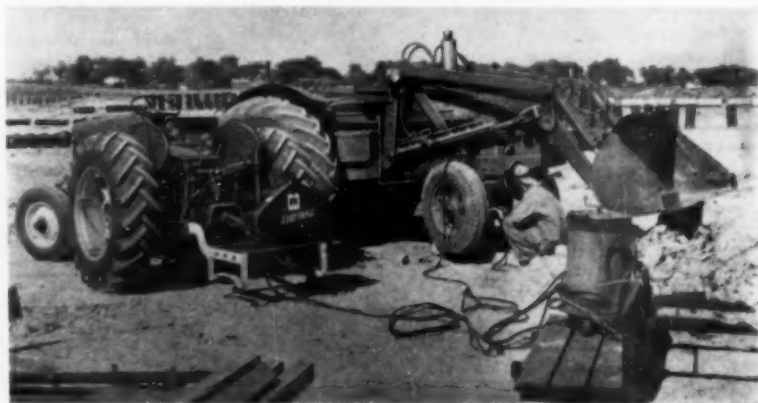
The AP-25T tractor is powered by either a 335- or 375-hp turbo-diesel engine. The specially designed trailer is rated at a capacity of 61 cu yd struck or 69 cu yd heaped.



Autocar New Planetary-Axle Tractor

Autocar Division of The White Motor Co, Exton, Pa.

For more details circle 103 on
Enclosed Return Postal Card.



International Harvester Fast-Hitch "Electrall"

Products

on Enclosed Postal Card

6750 lb. Trencher

Compactness in design, while incorporating all the features on larger machines is one of the advantages of the new Parsons 77 ladder-type "Trenchliner."

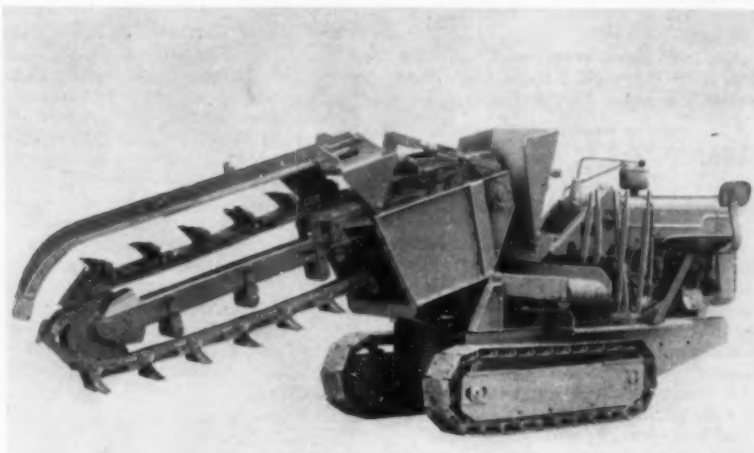
The 77 has a 5 ft. 10 in. roading and 5 ft. 5 in. digging height, 4 ft. width and total transportation weight of 6750 lb. Digging range is to 5 ft. depths at 6 to 18 in. widths. Sixteen digging feeds—from 4.4 to 181 in. per minute—are available.



and Matched Bottom-Dump Trailer

Optional sprocket feeds also total 16, ranging from 6.2 to 252 in. per minute.

Powered by an International



Parsons "Trenchliner"



Town and Country

Harvester U-175 engine, the trencher has 4 forward speeds: 0.375, 0.778, 1.42 and 2.41 mph. Reverse speeds: 0.307 mph. There is a new self-cleaning bucket line.

Parsons Co. (Division of Koehring Co.) Newton, Iowa.

For more details circle 104 on Enclosed Return Postal Card.

Truck-Built Striper

A completely new, all-purpose truck-built pavement striper has been introduced by Wald Industries. It is called "Town and Country."

Only one man is required to operate the unit. In the cab is a finger-tip push-button control box for automatic patterning of lines and regulation of intermittent advance and retard. Electrically controlled "Wald numatic" striping guns are within the operator's view at all times, as is also the pre-line

pointer. The machine operates completely within one lane, with an extremely short turning radius and close-to-curb flexibility. With a four-wheel drive on a jeep chassis it handles at from 3 to 10 mph working speeds, controlled by an automatic speed pilot.

Wald Industries, Huntingdon, Pa.

For more details circle 105 on Enclosed Return Postal Card.

New Compactor Converts to Sprinkler

Use of water ballast in the Seaman-Gunnison "Duo-Pactor" serves two purposes. First, the unit is equipped for sprinkling, raising the moisture content of the earth to the correct amount for proper compaction, then the tank is refilled for compaction purposes. The main ballast tank holds 760 gal. of water, totaling 6,360 lbs. A smaller tank holds another 240 gal. for watering the cocoa mats when using the rolls on bituminous hot mix. Further weight can be added by hydroflation of tires and other measures. Empty, the Duo-Pactor weighs 14,620 lb. Fully ballasted weight with water is 25,390 lb.

Seaman-Gunnison Corp., 2763 So. 27th St., Milwaukee 15, Wis.

For more details circle 106 on Enclosed Return Postal Card.

Heavy Duty Truck Engine

The new Cummins HF-6-B, a 180 hp diesel engine designed for long life in heavy duty trucking service has been announced.



Seaman-Gunnison "Duo-Pactor" with sprinkler bar

This new model HF is stated to reduce initial truck costs for operators because its torque characteristics permit use of low cost transmissions and drive lines.

The new model has been developed from its components of the Cummins NH.—crankshaft, block, connecting rod, piston pins, bearing valves and cylinder heads. It has a fully counter-balanced $4\frac{1}{2}$ in. diameter crankshaft and a total main bearing area of 61.15 sq. in.

Cummins Engine Co., Inc., 1000 Fifth St., Columbus, Ind.

For more details circle 107 on Enclosed Return Postal Card.

New Vibrating Roller

A new tractor-drawn vibratory roller using a hydraulic fluid motor instead of a gasoline engine has been announced by Rolcor Industries.

Five feet wide and $2\frac{1}{2}$ ft. in diameter, the Hydrapac weighs 3260 lbs. loaded, and can be attached to the rear end power takeoff of any tractor. Use of hydraulic power is said to have simplified the mechanism driving the vibrator and reduced the cost substantially.

Rolcor Industries, 1108 Nicollet Ave., Minneapolis 3, Minn.



Hydrapac Vibrating Roller

For more details circle 108 on Enclosed Return Postal Card

Hot Pour Joint Sealer

Several changes have been made in the clipper hot-pour joint sealer, which add greatly to its efficiency. The new model AC-40A, successor to the AC-40, combines the equipment for

melting and properly applying the sealing compound in one compact unit. Unit features one pass pressure sealing, direct from kettle to joint.

The AC-40A is equipped with a new type material pump called the



Clipper New Hot Pour Joint Sealer

"Moyno" which produces a smooth flow without pulsation and is stated to have proven superior to the normal piston and rotary type pumps for abrasive fluids such as asphalt.

A simplification of the piping and distribution systems minimized the possibility of material "freezing" in the pipes.

Clipper Manufacturing Co., Suite 250, 2800 Warwick, Kansas City, Missouri, U.S.A.

For more details circle 109 on Enclosed Return Postal Card

New In-the-Hole Drill

First field reports of Gardner-Denver's new in-the-hole drill, the "Mole-Drill" for use with rotary type rigs, indicate that it is capable of drilling large-diameter holes in the hardest formations with unusual speed. This increased speed is the result of extremely high foot-pounds of energy delivered directly to the bit and to the drill's unusual hole-cleaning ability. The "Mole-Drill" screws directly onto the bottom of standard drill pipe, and the stem

conducts the compressed air supply to the drill and rotates it.

This drill and other Gardner-Denver products will be on display at the National Crushed Stone Show at Chicago, Feb. 16, 1958.

Gardner-Denver Company, Quincy, Ill.

For more details circle 110 on Enclosed Return Postal Card.

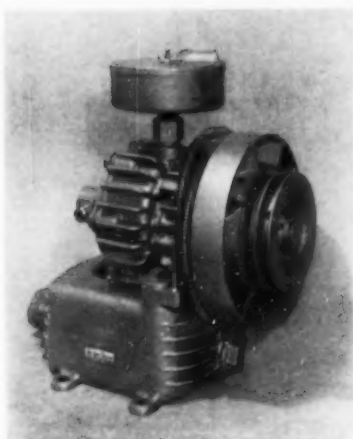
Rotary Air Compressor

Described as the first single stage "sliding vane" rotary compressor offered in a small general utility size, a new unit manufactured by Kellogg Division of American Brake Shoe Co., weighs only 55 lb. but has a rated output equal to that of a piston unit weighing more than twice as much.

The new compressor is designated the Kellogg-American model R-1. Manufactured in $1\frac{1}{2}$ and 2 hp ranges, the R-1 is being recommended for general utility purposes, these including applications in garages, service stations, paint shops, laundries, machine shops, and all other operations where air pressure in constant supply is required. The unique sliding vane principle of compression uses a rotor turning within an off-center housing. Compression up 200 per square inch is attained as entering air trapped between the sliding vanes is moved into increasingly smaller space between rotor and housing. The vanes are held against the off-center housing by centrifugal force; oil in constant circulation seals the compressing components. Discharge air temperature runs to about 200° F.—more than 100° cooler than discharge temperature for a comparable piston unit.

American Brake Shoe Co., New York, N.Y.

For more details circle 111 on Enclosed Return Postal Card.



Kellogg-American Compressor

Tree Trimmer Truck

The "Skyworker", here shown, is used by the Milwaukee Railroad to keep communication and power wires along its right-of-way free of tree branches. With a 3-man crew, it has been in almost constant use at various points on the line since the railroad acquired it early in 1957. The device features a hydraulically operated boom with a straight up reach in excess of 40 ft. Overhead boom travel is 43 deg. past the vertical, and horizontal travel 40 deg. past full circle, permitting workers to reach a maximum area without moving the FWD truck on which the equipment is mounted. Tree trimming tools include two power pruners, a chain saw and a reciprocating saw capable of cuts up to 6 in., all operated by air from a compressor on the truck.

Boom movements are controlled from the crow's nests, with an auxiliary set of controls at the base of the unit for safety reasons. The crow's section of the boom also is covered

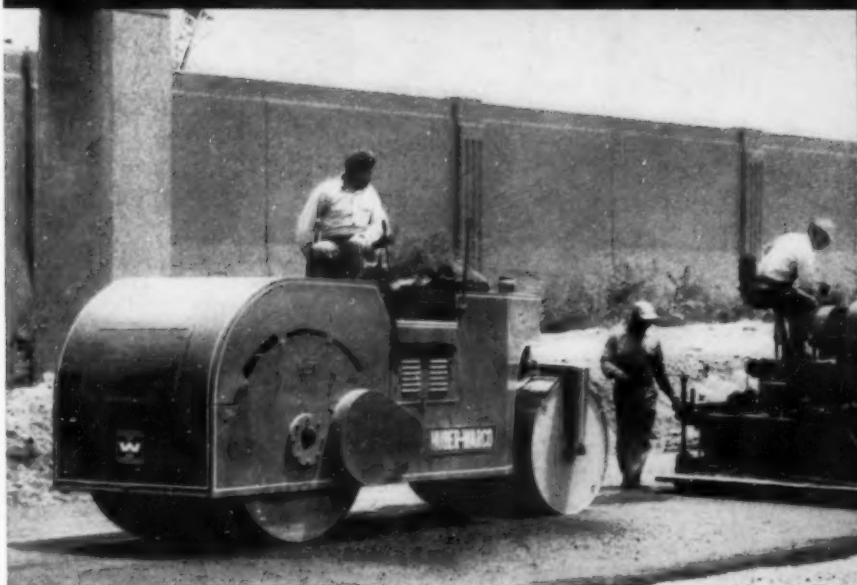


The Emhart "Skyworker"

105

HUBER-WARCO

tandem rollers



smooth, positive rolling action

Huber-Warco medium and large size TANDEM ROLLERS offer a torque converter, tail-shaft governor and 2-speed transmission for a new ease of operation and smooth roller performance. The operator sets the speed and it is maintained automatically, regardless of grade encountered. Models range from 5-8 to 10-14 ton. A 3-5 ton model with torque converter and water-cooled engine is also available. See your Huber-Warco distributor for complete details.



MOTOR GRADERS



TANDEM ROLLERS



3-WHEEL ROLLERS



MAINTAINER

Products of HUBER-WARCO COMPANY, Marion, Ohio, U. S. A.

HUBER-WARCO COMPANY, Marion, Ohio, U.S.A.

☐ Send specifications on Huber-Warco tandem rollers.

Send specifications on: ☐ Maintainer
☐ Motor Graders ☐ 3-Wheel Rollers

Name

Title

Company

Address

City Zone State



2-RS

with fiberglass to insure safety of operators when working in proximity to power lines.

Emhart Manufacturing Co., "Sky-worker" Division, Milford, Conn.

For more details circle 112 on Enclosed Return Postal Card.

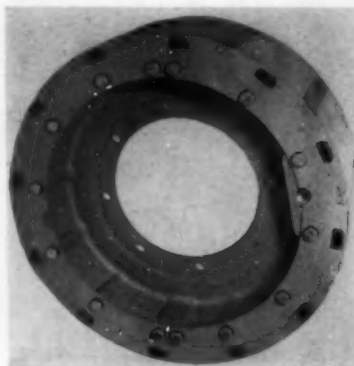
Heavy Duty Brake

A new, full circle, hydraulic drum type brake, with 360° expander tube actuation, designed exclusively for large tractors, scrapers and earthmovers, is announced by B. F. Goodrich: its name the "Hi-Torque".

The new brake is said to operate with nearly constant lining pressures at all points around the drum area, at only one-half the usual maximum lining pressure encountered with anchored shoe brakes. Built-in automatic adjustment assures constant braking efficiency throughout the life of the lining, with low maintenance and slow lining wear.

Brake fade is reduced by the lower, pressure and non self-energizing design.

Made in most popular sizes, this brake is bolted as a single unit to the axle or axle housing of the vehicle, and uses either the existing air supply (with B. F. Goodrich master cylinder) or hydraulic power from the central system.



Goodrich "Hi-Torque" Brake

B. F. Goodrich Aviation Products, Troy, Ohio.

For more details circle 113 on Enclosed Return Postal Card.

Cable Dump Trailer

A new and completely redesigned Hobbs-Schonrock cable dump trailer is now in production.

From nose to tail gate, from sub-frame to top side rails, each portion of the trailer has a new look, stated to result in more efficient hauling and dumping operations. Greater strength



Hobbs-Schonrock Cable Dump Trailer

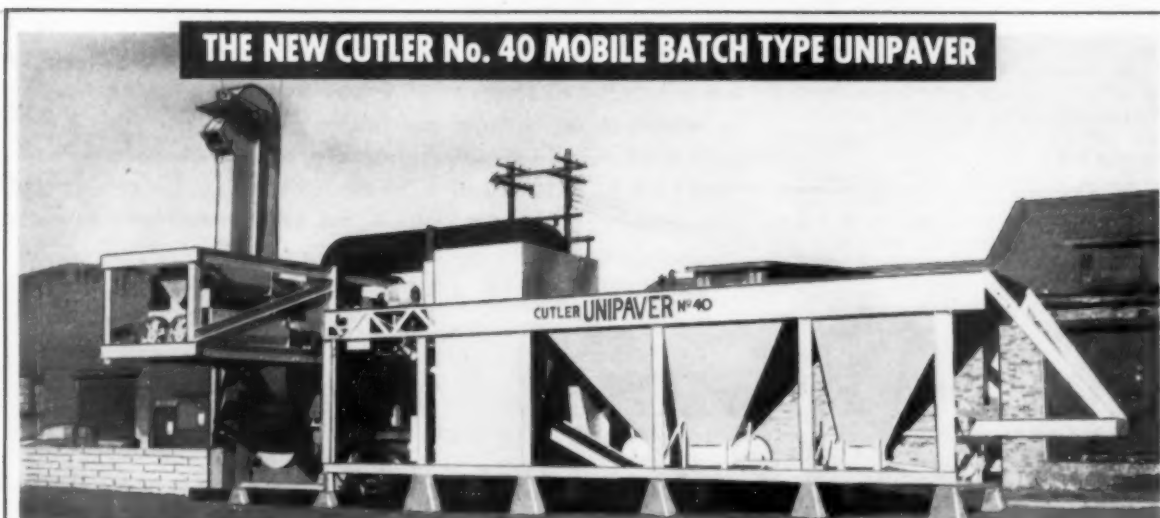
and less strain during the dumping cycle are claimed for the new booster fifth wheel design.

The trailer is available in single and tandem axle models. Length of the single axle model is 15 ft 9 3/4 in.—the tandems are available in 20 to 32-ft length standard.

Hobbs Trailers, 609 North Main St., Fort Worth, Texas.

For more details circle 114 on Enclosed Return Postal Card.

(More new products on next page)



THE NEW CUTLER No. 40 MOBILE BATCH TYPE UNIPAVER

A complete 2000 lb. batch type Asphalt plant - 40 tons per hour

**THE FINEST MEDIUM
SIZED MIXING PLANT
AVAILABLE . . . YET
REASONABLY PRICED
TO FIT YOUR MEANS**

The No. 40 Unipaver is a ruggedly built, efficient asphalt plant with features found only in plants costing much more.

It's a reliable and versatile one man operated plant, capable of producing 300 tons and more per 8 hour day without strain on machine or operator.

There's nothing like the Unipaver, a plant that does so much—so well and at such a surprisingly modest cost.

If you are interested in a plant at a down to earth price, built for heavy duty, simple to operate and a money maker, then be sure to check the features found in the No. 40 Unipaver.

for further information write: **CUTLER ENGINEERING CO. 5435 W. 63rd St. • Chicago 38, Ill.**

. . . for more details circle 254 on enclosed return postal card

New Diesel Truck

Diamond T's new 923 diesel series is designed specially for the payload weight which most of the country's operators commonly handle—18-22 tons. Gross vehicle weight rating of the standard model is 29,000 lb; but with optional oversize front axles and tandem rear axles, GVW is as high as 60,000 lb.

The power plant is the new Cummins HF-6B diesel which was developed in collaboration with Diamond T engineers. It has a piston displacement of 672 cu. in. and develops 180 brake horsepower at 2100 rpm. Maximum torque output is 450 lb ft. A wide range of tandem axles is available for either on or off-highway service. There are also several transmission choices.

Diamond T-Motor Car Co., 4401 W. 26th St., Chicago, Ill.

For more details circle 115 on Enclosed Return Postal Card.

New 22-Ton Fork Lift

A fork-lift machine, the new series "F. J. Stacker" with steel "fingers", which can lift 22-ton loads of various materials has been built by R. G. Le Tourneau, Inc. for a west coast firm. Many types of materials normally handled in unpaved areas ranging from steel products to pre-cast concrete structures, are said to offer work opportunities for this type of rough terrain machine.



Letourneau "F. J. Stacker"

Depending upon the type of materials to be handled, the "Stacker" can be furnished with fork, crane, ram fork and tusks, or fork and jointed tusks. Because it has all-electric power, from wheel drives to raising and lowering of the tusks, there are no clutches, drive shafts or other mechanical drive mechanisms. High-torque motors are spotted over the machine to deliver geared power directly wherever power is needed.

R. G. LeTourneau, Inc., 2399 South MacArthur, Long View, Texas.

For more details circle 116 on Enclosed Return Postal Card.

HUBER-WARCO

maintainer



a profit-maker on any job

The Huber-Warco M-52 MAINTAINER, with torque converter, is an all-purpose, year 'round performer, capable of outperforming many machines that are larger, heavier, more costly, slower, more expensive to operate, and more limited in use. With hydraulically controlled attachments, the M-52 MAINTAINER will perform service as a lift-loader, bulldozer, highway mower, broom, snow plow, side dozer, berm leveler and patch roller. See your Huber-Warco distributor for complete details.



3-WHEEL ROLLERS



MAINTAINER



MOTOR GRADERS



TANDEM ROLLERS

Products of HUBER-WARCO COMPANY, Marion, Ohio, U. S. A.

HUBER-WARCO COMPANY, Marion, Ohio, U.S.A.

☐ Send specifications on the Huber-Warco M-52 Maintainer.

Send specifications on: ☐ Motor Graders
☐ Tandem Rollers ☐ 3-Wheel Rollers

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____





Installing "Aqualiner" on an Irrigation Canal.

Prefabricated Asphalt Liner For Reservoirs And Canals

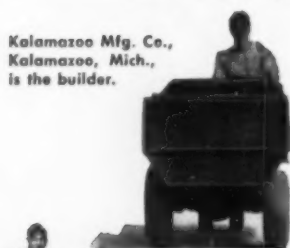
Under the name "Aqualiner", an especially prepared asphalt sheet has been placed on the market for the positive containment of water in irrigation and water supply canals, ditches, and reservoirs. It is applicable also for use with brines, sludges, wastes and sewage.

In composition, the material is a heavy-duty asphalt mastic sheet, surfaced with asphalt-saturated felt for added toughness and ease of handling, and coated with a high-melt point, weather-resistant asphalt film to give added resistance to exposure conditions such as are encountered in res-

ervoir, canal, and related installations. It is available in two thicknesses— $\frac{1}{2}$ in. and $\frac{1}{4}$ in., in 4 ft. widths. It is factory-cut as required by the job.

Presstite-Keystone Engineering Products Co., a division of American-Marietta Co., 39th and Chouteau, St. Louis, Missouri.

For more details circle 117 on Enclosed Return Postal Card.



Kalamazoo Mfg. Co., Kalamazoo, Mich., is the builder.



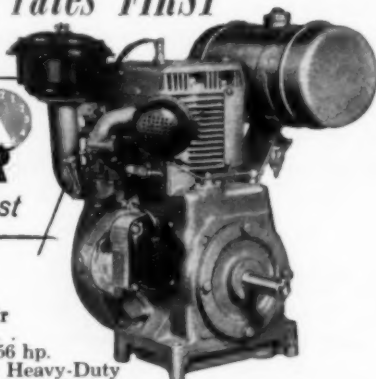
Built by Creative Metals Corp., Emeryville, Calif.



Monroe Concrete Trucks, built by John's Mfg. Co., Grand Junction, Mich.

WITH
Professionals
WISCONSIN-
POWERED equipment
always rates FIRST

full-time
POWER
at its best



• Interesting fact! The great majority of the men earning their living in the construction field . . . men in the know . . . rely on 3 to 56 hp. equipment powered by Wisconsin Heavy-Duty Air-Cooled Engines. These men know that the percentage of profit often rides on the rugged dependability of the equipment working on the job. And they know, from actual experience, that Wisconsin Engines deliver this kind of dependability . . . full time power . . . day after day, month after month.

Wisconsin Engines are built by engine specialists. All skills and know-how are funneled in one direction, producing only one product . . . air-cooled engines, 3 to 56 hp.

"Down time" is cut to an absolute minimum when you specify equipment powered by Wisconsin Heavy-Duty Air-Cooled Engines. Local availability of parts and service through 2,000 service stations . . . several near you. Write for bulletin S-223, describing all models.



WISCONSIN MOTOR Corporation

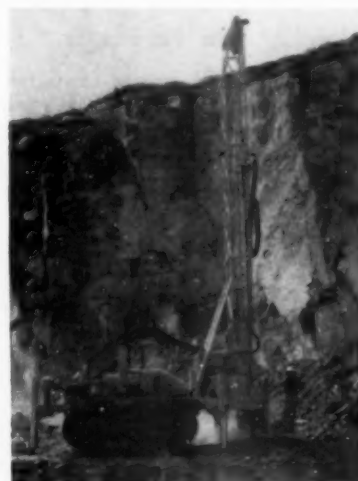
World's largest builders of Heavy-Duty Air-Cooled Engines
Milwaukee 46, Wisconsin, U. S. A.

2,000 SERVICE STATIONS . . . SEVERAL NEAR YOU

. . . for more details circle 329 on enclosed return postal card

Blast Hole Drill

A new "Portadrill," model 105TA, engineered for blast hole and exploratory drilling in all strata, including hard rock, is now being introduced. The drill is mounted on an Eimco 105 diesel tractor with 125-143 hp. Two compressors, furnishing 1000 cu ft per minute, remove cuttings from the hole with normal pressures from 15-17 psi, and up to 50 psi are available for cleaning the hole in wet or sticky substances. Compressors may be used singly or together as needed.



"Portadrill" Blast Hole Drill

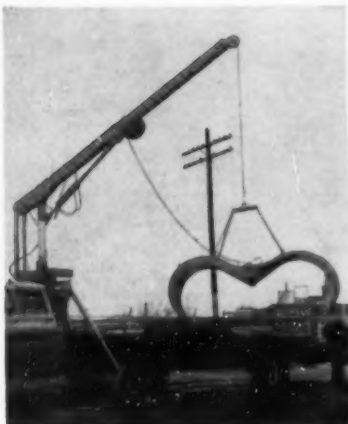
A deflector hood and a water spray system at top of hole protects both crew and equipment from dust and cuttings. A cuttings collection system is also available for exploration or sampling work. In sandstone, shales, limestone and other similar formations the 105TA has a rated capacity of 300 ft to 400 ft of 9 in. holes per shift utilizing standard roller cone rock bits.

Portadrill Division, The Winter-Weiss Co., 2201 Blake St., Denver 5, Colorado.

For more details circle 118 on Enclosed Return Postal Card.

Hydraulic Grapple Fork

A new hydraulic grapple fork attachment for its "Versa Lift" truck-mounted crane has been announced by Teale & Co. The jaws open to 7 ft.



Teale Grapple Hook With Jaws Open

between its points and overlap when closed, leaving an opening 24 in. wide by 26 in. high between jaws. Opening and closing is by easily controlled hydraulic power. Two spring-loaded "take-up" reels keep slack out of wire-braid hose. Heavy duty swivel prevents load turning unless desired. The attachment weighs 750 lb.

Teale & Co., Box 308, Omaha, Neb.

For more details circle 119 on
Enclosed Return Postal Card.

25-Ton Truck Crane

A new 25-ton truck crane, model 100 BT, has been added to the Gar-Wood line of cranes and power excavators. The new unit features a hydraulic counterweight removal system, a choice of 6 x 6 ft. Gar-Wood chassis, are high capacity clutches and breakers for above average precision in steel erection work.

Both sizes of the Gar-Wood built carriers feature detachable rear outrigger housing which conveniently allows gross weight to be reduced to conform to highway load restrictions. A live boom hoist, direct gear drive, conical hook rollers and fabricated machinery deck are also featured in the 25-ton machine.



Gar Wood 25-Ton Truck Crane

109

HUBER-WARCO

motor graders



balanced weight and power

The Huber-Warco 6-D & 7-D MOTOR GRADER series has been designed with the right blend of weight and power to handle tough grading quickly and efficiently. A combination of torque converter, tail-shaft governor and power-shift transmission assures constant power at the blade for a greater work volume. Horsepower range of the Huber-Warco 6-D & 7-D MOTOR GRADERS is 100 to 150 h.p. Your Huber-Warco distributor would like to show you the many other features of these modern graders. Contact him today.



MAINTAINER



MOTOR GRADERS



TANDEM ROLLERS



3-WHEEL ROLLERS

Products of HUBER-WARCO COMPANY, Marion, Ohio, U. S. A.

HUBER-WARCO COMPANY, Marion, Ohio, U.S.A.

Send me specifications on the Huber-Warco

☐ 6-D & 7-D series ☐ other motor graders

Send specifications on: ☐ Maintainer

☐ Tandem Rollers ☐ 3-Wheel Rollers

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____



2-R5

The 100 BT's machinery deck is permanently rigged for all ordinary attachments, thereby reducing conversion time to a minimum. Both 8 and 9 ft. rear axles are available.

Manual and hydraulic counterweight removal systems are offered as options on the 100 BT.

Gar Wood Industries, Inc., Customer Service Department, Wayne, Mich.

For more details circle 120 on
Enclosed Return Postal Card



International Harvester's 330 "Utility" Tractor

Engine Throttle Booster

The Holan automatic hydraulic engine throttle booster for use with hydraulic earth borers goes into action when the auger meets greater resistance and requires more power in order to maintain uniform speed. As more torque is required, the hydraulic pressure in the circuit builds up to a point where a spring-actuated plunger operates a lever which opens the carburetor valve. As pressure increases the valve opens farther, giving the power necessary to maintain a more uniform engine and auger speed.

J. H. Holan Corp., 4100 West 150th St., Cleveland 11, Ohio

For more details circle 121 on
Enclosed Return Postal Card

35-HP "Utility" Tractor

The new "McCormick International 330 Utility" tractor, delivering an estimated 35 hp at the belt, has the built-in strength and power capacity for handling heavy-duty backhoes, hoisting 4,000-lb loads with a fork lift, or lifting 1,250-lb. loads with a front-mounted loader.

A wide variety of matched equipment adapts it to almost any wheel tractor job. Over 35 types of utility equipment are available, ranging from backhoe, blades, and loaders, to mowers, snow plows, and sweepers. Special mounting pads help speed equipment changeover. In addition, many optional items are available, including "Fast-Hitch", "Torque-Ampli-

fier" drive, "Hydra-Touch" hydraulics, power steering, and independent power take-off.

International Harvester Export Co., 180 N. Michigan Ave., Chicago 1, Ill.

For more details circle 122 on
Enclosed Return Postal Card

Frameless Dump Trailer

A new frameless dump trailer (Model 254-F-G) with its body hinged at the rear of the tandem bogie, thus permitting all wheels to remain on the ground when the body is in an elevated position, is offered to the construction industry, by Trailmobile.

(Continued on page 115)

ALWAYS, More and Better Compaction with

BMCO'S SELF-PROPELLED ROLLER

MODEL SPR-9

4 SPEEDS FORWARD — 4 SPEEDS REVERSE

The finest "self-propelled" pneumatic tired roller... ANYWHERE! The largest power unit of any roller in its class... larger displacement... more horsepower with a torque converter as standard equipment. The SPR-9 is rugged... durable... dependable, and only BMCO has complete oscillation on all wheels! IT IS IMPOSSIBLE TO OVER-LOAD ANY ONE TIRE! All wheels act independently in this exclusive design... each bearing its share of the load. As a result, better traction and more uniform compaction is attained, more quickly than by any other make of roller!

OTHER QUALITY ITEMS IN THE BMCO LINE:



... for more details circle 243 on enclosed return postal card



MODEL SPR-9B

The same specifications as the SPR-9, except: a smaller power unit and heavy duty industrial type clutch... however, this power unit is still more powerful than all others in its class... same 4 forward speeds... same everything as in the "deluxe" model, but approximately \$1,000 less.

BROWNING MANUFACTURING CO.

111 HUMBLE AVENUE P. O. BOX 2707
SAN ANTONIO 6, TEXAS

BMCO AND ROCKBUSTER ARE COPYRIGHTED TRADEMARKS
OF THE BROWNING MANUFACTURING CO.

FIRST...

get
the facts
from

DAYBROOK



Illustrated: Daybrook Series 1040 Excavator Style Dump Body with Series 9C Hoist.

Here are the Facts . . . Check for equipment of interest—attach coupon to your letterhead, sign your name and mail.

- ☐ Daybrook Dump Bodies
- ☐ Daybrook Hoists (Direct Lift, Double Arm and Telescopic Types)
- ☐ Daybrook Power Loader (Crane for Truck)
- ☐ Daybrook Power Gate

RS-1

FACTS that PAYOFF—on the job...

Operators say Daybrook bodies and hoists take the impact of heavy, rock-and-dirt loads better . . . dump loads with timed routine to keep the job moving on schedule. The reasons . . . Daybrook heavy-duty understructures; rugged full height corner posts; heavy-duty hardware; improved design (50% stronger) double-acting tailgate; strong side bracing and sloping running boards. In addition, Daybrook Speedlift underbody hoists (direct lift and double arm) have the exclusive Daybrook one-year warranty on the sealed cylinder.

CONTRACTORS—EXCAVATORS . . .
Daybrook has the craftsmanship and built-in quality you expect . . . and get!



DAYBROOK HYDRAULIC DIVISION YOUNG SPRING & WIRE CORPORATION, BOWLING GREEN, OHIO

Only **PAYLOADER®** can give you



as a Side Boom . . .

. . . this new SUPERIOR-HOUGH boom attachment further increases the all-around usefulness of a "PAYLOADER" tractor-shovel. A Hough exclusive on rubber-tired units, it adds a handy lift-and-carry facility, lets the "PAYLOADER" alternate between boom and bucket work at any time.

You can load, unload and string pipe, carry girders and sheet steel, handle piles and poles . . . or, dig and backfill dirt, load dump trucks, charge hoppers and the like — all without any time loss to change attachments.

Available for the big model HO "PAYLOADER", this side boom has 6000 lb. capacity, its 10 ft. length can be telescoped to 16 ft. maximum. This, combined with the sturdy 4-wheel-drive tractor-shovel performance, provides an economical one-machine answer to many construction and maintenance problems.

Big rubber tires permit working on pavement, over sidewalks and curbs without damage; 4-wheel-drive tractive power qualifies it for cross-country work as well.



PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



1-B-1 A



as a Spreader . . .

. . . another new and exclusive attachment that multiplies the work-ability of "PAYLOADER" tractor-shovels. Substitute this Ram Spreader attachment for the bucket and you have an economical unit that lays down 8-ft. wide strips of hot or cold mix asphalt in a single pass.

You can use it to place new pavement, to do resurfacing or patch work on streets, driveways, alleys, sidewalks, playgrounds, parking lots. Attached to the maneuverable "PAYLOADER", the machine can work in close quarters where pavers and trucks can't operate.

Spreader features include a 2-cu. yd. capacity hopper that is independently suspended on four pneumatic tires. A separate air cooled gas engine provides pressure for the hydraulic motor drive of the twin 8" diameter augers and for all hydraulic control cylinders.

Operator has convenient control levers to adjust main feed gate, thickness and width. Sliding type gates adjust for widths to 48 in.; gates are removed for 8-ft. width. See your nearby "PAYLOADER" distributor for complete details.



PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



1-B-1 B

this Versatility, Speed and Economy



as a 4-in-1 ...

... a "PAYLOADER" handles many jobs other wheeled tractor-shovels can't touch. Equipped with a DROTT "4-in-1" bucket, it combines shovel, clamshell, scraper and bulldozer action in a single tool.

The "4-in-1" actually gives you the utility performance of four machines *plus* the mobile speed and tractive power of a 4-wheel-drive tractor-shovel. "PAYLOADER" is the only rubber-tired tractor-shovel available with this patented "4-in-1" bucket.

This combination of rubber-tired tractor mobility and bucket versatility provides complete on-job flexibility. You can dig, carry and dump (shovel) ... pick-up, grasp and handle (clamshell) ... scrape, strip, grade and spread (scraper) ... backfill, clear and doze (bulldozer).

Reliable 4-wheel-drive "PAYLOADER" performance is assured by power-transfer differentials, "no-stop" power-shift transmission and torque converter, planetary final drives, power-steering and power-brakes plus exclusive 40° tip-back at ground level.



PAYLOADER®
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY-INTERNATIONAL HARVESTER COMPANY



1-B-1 C



as a Back Hoe ...

... the "PAYLOADER" becomes a mobile trenching unit. With a quick interchange of bucket and hydraulically operated Wain-Roy hoe attachment it can work in a 190° radius, dig to 12' depth to install service connections, foundations, bell-holes and footings easily and economically. It can dig and dump at any angle up to 95°, right or left—a valuable feature in close quarters and heavy traffic areas.

The unit operates with only four control levers. Twin hydraulic cylinders provide a powerful digging and break-out force. Self-leveling hydraulic stabilizers relieve the tractor of undue strains. The extra work capacity you get with this back-hoe attachment at a nominal investment is worthwhile.

For Your Convenience ...



Now your Hough Distributor has at his disposal the broadest and most complete set of financing

plans ever offered: —

TIME PAYMENT ... LEASING PLANS,*

with or without OPTION TO PURCHASE —

any and all kinds of financing to best fit your needs for the purchase of "PAYLOADER" equipment. See him today!

* (Available in Continental U.S.A.)

1-B-1 D

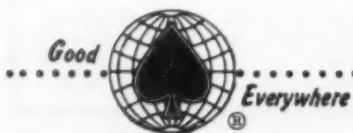
**Trench digging
with Cleveland
cuts repaving
costs 25%**



ERN CONSTRUCTION CO's new Cleveland 110 Trencher cut repaving costs 25% on the installation of 11,000 feet of 12 and 8 inch pipe throughout East Brunswick Township near Springfield, New Jersey. Trench was 5½ feet deep and 24 inches wide. Foreman Henry Appleby says:

"We're able to reduce repaving costs 25% with the Cleveland because it cuts cleaner, narrower trench than the backhoe method we used previously."

"We get better production, too," says Appleby. "The Cleveland digs about 780 feet of trench per hour compared to about 100 to 150 feet with the backhoe."



The CLEVELAND TRENCHER co.

20100 St. Clair Avenue

Cleveland 17, Ohio

With the new design, the trailer frame is an integral part of the body and is stated to make the unit up to 3,000 lbs. lighter than conventional dump trailers. This weight saving, plus an allowable longer wheelbase, assures greater payload. The choice of inside length ranges from 21 to 32 feet. Over-all width is 95½ in.; inside width is 88-in. The body may also be used with a anglo-axle tractor.

Trailmobile, Inc., 31st and Robinson Ave., Cincinnati 9, Ohio.

For more details circle 123 on Enclosed Return Postal Card.



Trailmobile Dump Trailer

High Altitude Normalizing Kit for Tractor

Reduction of engine horsepower in high altitude operation can be eliminated on the Caterpillar D6 tractor by the use of a normalizing kit recently made available. The D6 tractor thus joins the D7 and D 8 to become the third machine in the company's line to be so equipped.

The new kit, which consists of a turbocharger and all manifolds needed to mount it on tractor engine, delivers air at greater than atmospheric pressure, thus permitting complete fuel combustion and restoring "sea level" horsepower up to 10,000 ft. altitude. For example, when operating at an altitude of 8,000 ft., the normalized D6 will operate at the machine's full sea level rating of 90 hp, while the standard D6's capacity at the same altitude would be 79 hp. The Normalizing kit does not increase the horsepower of the tractor while operating at sea level. The kit is available either for factory installation on new D6 Tractors, or for field installations on machines already in operation.

Caterpillar Tractor Co., Peoria, Ill.

For more details circle 124 on Enclosed Return Postal Card.

Oliver Expands Construction Equipment Line for 1958



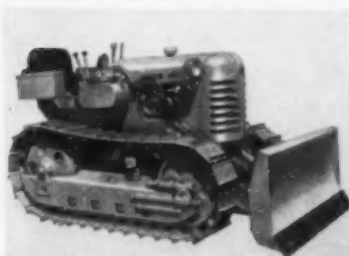
Oliver 990 7 cu. yd. Self-Propelled Scraper

The broadest line of construction equipment ever offered by the Oliver Corporation will be in volume production in 1958.

In its crawler tractor line, Oliver will have more sizes and types—from the improved 28 h.p. OC-4 to the OC-18 of 161 h.p.

The OC-4 will be available with a new trencher attachment, and other versatile mounted attachments including a hydraulic side boom for pipeline work.

In the 62 h.p. range the OC-12 has additional work-speeding and versatile attachments including rear-mounted scarifier. The OC-126 loader will have a new angle blade for mounting on the loader arms, and to round out its versatility, a lifting boom and fork attachments are included.



OC-4 Dozer

The OC-15, a 110 net engine h.p. crawler, will save a new 2½-yd. loader, with side pedestals kept well below the usual level.

New features of the OC-18 are a cable-operated angleblade and bulldozer offered with this machine.

In the rubber-tired tractor field there will be a full line-up of models in the Super 55, 77, 88 and 99 series, which mount a full line of attachments. New will be a torque converter and Reverse-o-matic on the Super 77.

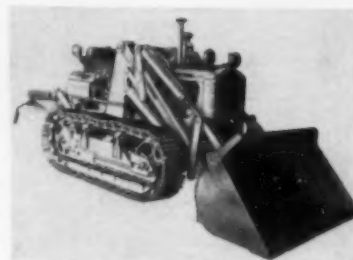
The 990 self-propelled scraper, 71-cu. yd. heaped rig, created for the user requiring the speed and efficiency of a scraper on smaller jobs as well as for a full-in rig for cleanup work on larger projects, is powered by the GM 3-cylinder, 103 net h.p. diesel engine.

Oliver will also enter the rubber-tired loader field with a 1¾ yd. machine having 4-wheel drive with torque

converter and an unusual operating range with high-lift bucket and rapid cycling time. Details of this machine are to be announced shortly.

The Oliver Corporation, Industrial Division, 19300 Euclid Ave., Cleveland 17, Ohio.

For more details circle 125 on Enclosed Return Postal Card.



OC-126 Loader

New Dump Trailers

A new line of extra payload dump trailers has been introduced by the recently formed Loadmaster Co. The trailers incorporate innovations in design which permit reductions in empty weight of 1000 to 3000 lb. per trailer. A new hydraulic cam action lift system permits high dumping angles - as high as 80° on some models and 60° on the longest dump beds.

Production models are being offered in 10 to 30 cu. yd. capacities, with beds from 16 to 28 ft. in length mounted in single and tandem axles.

Loadmaster Co., P. O. Box 4263, Shreveport, Louisiana.

For more details circle 126 on Enclosed Return Postal Card.

Mobile Radio Equipment

General Electric Communication Products Department has announced the communication industry's first transistor-powered line of mobile radio equipment. A 60-watt mobile unit is a feature.

Last June, GE pioneered in the introduction of transistorized power sup-

plies for the receiver portion of mobile units; and now features transistor power for both the transmitter and receiver. The combination is stated to make possible more dependable communications. Because of the reliability of the new power supplies, out-of-service time is stated to be reduced.

General Electric Communication Products Department, Electric Part, Syracuse, N. Y.

For more details circle 127 on Enclosed Return Postal Card.



Loadmaster Dump Trailer

Portable Testing Machine

A new high-capacity portable testing machine announced by Soiltest, Inc., is designed for rapid on-the-job testing of concrete and similar materials with laboratory accuracy. It is operated by hand-power pump, is entirely self-contained, has a capacity of 250,000 lb., can be used for testing either cylinder



Soiltest Portable Tester

or beams and meets ASTM and AASHTO specifications for design and accuracy.

Soiltest, Inc., 4711 W. North Ave., Chicago 39, Ill.

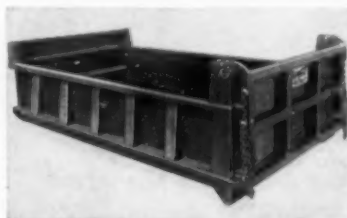
For more details circle 128 on Enclosed Return Postal Card.

Heavy Duty Dump Box

New design features have been incorporated with Gar-Wood-St. Paul GC-2 heavy duty dump bodies. The body now includes box type side

bracers for greater support for the side panels. New vertical and horizontal bracing for the tailgate protects it from distortion even under the roughest use.

Additional strength for the body is provided by continuous welding around all side braces and the tailgate.



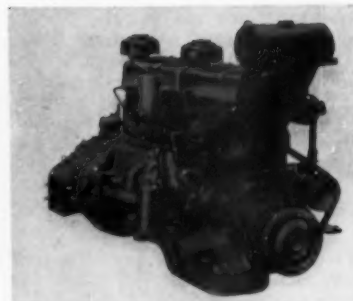
Gar Wood-St. Paul GC-2 Body

A new wrap-around angle brace strengthens the body's corner post and entire rear end, and prevents bending of the floor at the rear edge.

To make dumping easier, the body's tailgate hinge point is 2 in. higher than the top edge of the tailgate. This prevents the load from exerting a counter force on top of the tailgate, allowing it to swing free without bending or breaking.

Gar Wood Industries, Inc., Customer Service Department, Wayne, Mich.

For more details circle 129 on Enclosed Return Postal Card.



Curtiss-Wright Diesel Engine

Diesel Engines

Curtiss-Wright Corporation has announced the OM-315 Mercedes-Benz diesel engine is now available in the U.S. through its Utica division. This engine is in the 82 to 127 hp range from 1200 to 1800 rpm. It is a 6 cylinder, vertical-in-line, 4-cycle, liquid-cooled engine with a compression ratio of 18.5 to 1 and weighs 1775 lbs. It provides the pre-combustion chamber type combustion system together with Robert Bosch injection pumps and nozzles.

The OM 321 Mercedes-Benz in the 60 to 96 hp range at speeds from 1500 to 2000 rpm is also available.

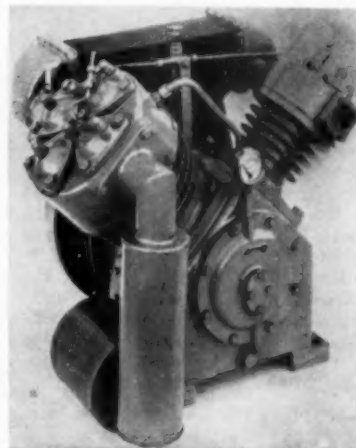
The Utica Division, Curtiss-Wright Corporation, Utica, Michigan.

For more details circle 130 on Enclosed Return Postal Card.

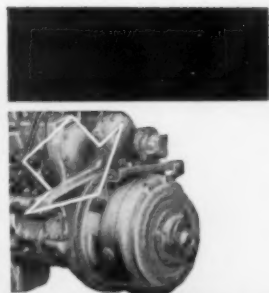
New Air Compressor Series

A new series of continuous duty air compressors delivering from 47 to 105 cu ft of air per minute at pressures of 100 lb per square inch has been announced as the "Atlas Copco NT Series." These units are designed to serve the air requirements of small contracting crews, small manufacturing concerns, repair shops, quarries,

(Continued on page 120)



Atlas Copco Compressor



Left: An array of Caterpillar-built machines working on the first portion of the Federal-Aid-Highway program as it opened near St. Charles, Missouri. Torque converter components for the D8's are furnished by Twin Disc.

Below: A Caterpillar D9 Tractor, equipped with torque converter drive utilizing Twin Disc components, 'dazes its way through heavy rock.'



How Cameron, Joyce & Company opened the Federal-Aid Highway program... with torque converter equipped D9's and D8's

When Cameron, Joyce & Company began moving earth for a 2.8-mile stretch of four-lane highway near St. Charles, Missouri, this well-known Keokuk, Iowa, contracting firm provided the kick-off for the greatest construction project ever known!

It was a big job... and it called for big equipment. So Cameron, Joyce & Company brought in its torque converter equipped Caterpillar D9 and D8 Tractors. According to Tench T. Gammon, the firm's treasurer, here's why:

"The torque converter equipped machine outproduces a comparable mechanical drive unit by about 20 per cent. On top of that, it improves serv-

ice life by about the same percentage... thanks to the cushioning effect of the converter's fluid connection. Another important feature is its greater ease of operation, for little or no driver fatigue."

Caterpillar offers both its D9 and D8 Tractors with torque converter drive or direct drive... and standardizes on Twin Disc components for the torque converter versions of these two tractors.

In all three leading makes of crawler tractors, whether the torque converter drive is standard or optional, the components are furnished by Twin Disc. Specify a torque converter drive in your next machine. See

for yourself how they pay for themselves on every job.

Twin Disc Clutch Company, Racine, Wisconsin; Hydraulic Division, Rockford, Illinois.



... for more details circle 326 on enclosed return postal card

ROADS AND STREETS, February, 1958



Moving 16,000 to 20,000 tons of

One of the biggest and most efficient stone-crushing plants on this continent is owned by The Highway Paving Company Limited of Montreal, which recently increased its capacity from over 400 tons per hour to over 1600 tons per hour.

Almost all of this operation is automatic. However, quadrupling production involved moving rock from quarry face to crusher in sufficient quantity to assure Highway Paving's booming operations of a continuous supply of crushed stone.

Seven Macks were given the job. Working under six-yard electric shovels, they shuttle from shovel to crusher, each making 10 trips an hour; the seven trucks average over 16,000 tons per day. The shovels really have to move to keep up with the hustling Macks, which are on the go 10 hours a day.

Highway Paving knows that its production of crushed stone is dependent on equipment that must maintain "the pace that kills", day after week after month, without crippling breakdowns. Their Macks



Mack being loaded by one of the six-yard electric shovels. The Macks take a brutal beating from the seven-ton impact of broken limestone dropped with each shovel pass . . . but come right back for more.



rock per 10 hour day with 7 trucks

have proved that they are worthy of this dependence. In fact, no other make of dump vehicle is used in this quarry.

Macks have everything it takes for dependable, profitable quarry, mine or construction hauling. Your nearest Mack representative will be glad to give you the names of Mack users in your area who are racking up new production records, with minimum down time and top economy. Mack Trucks, Inc., Plainfield, New

Jersey. In Canada: Mack Trucks of Canada, Ltd.

MACK
first name for
TRUCKS

5511

... for more details circle 299 on enclosed return postal card

Dumping rock into Highway Paving's huge crusher which is so located that trucks can dump into it from both sides. Number of loads emptied into crusher are counted electronically, and tonnage crushed is determined by belt weighing equipment.



New Products

(Continued from page 116)

farmers, and other limited users of compressed air.

Ranging in weight from 440 to 595 lb, they may be installed either as stationary or portable units.

All models are air-cooled, two-stage, two-cylinder, single-acting machines. They are designed for direct coupling to high-speed electric motors or for V-belt drive from higher speed electric motors or diesel engines, and are available in power-pack units.

Atlas Copco Eastern, Inc., 151 Linwood Ave., Patterson, N. J.

For more details circle 131 on Enclosed Return Postal Card.

Hooks $\frac{3}{4}$ ton to 150 ton

A new line of load rated Crosby-Laughlin hooks in sizes from $\frac{3}{4}$ ton through 150 tons is now available. These hooks are stated to offer higher capacities and each hook is unconditionally guaranteed against breakage. These new drop forged heat treated steel hooks provide adequate static strength, yet will not be cold, brittle or notch sensitive. They will take tre-

mendous impact loads even at temperatures of zero or below.

Crosby-Laughlin Division, American Hoist Derrick Co., Fort Wayne, Indiana.

For more details circle 132 on Enclosed Return Postal Card.



Crosby-Laughlin Hooks

Air Impact Wrench

A more compact, lighter, yet more powerful $\frac{1}{2}$ in. drive Thor-Air impact wrench, model 024, for industrial use has two exclusive new features.

Simplified impact mechanism with only four moving parts, no springs or gears, and unitized construction for easy inspection removal.

Needle bearing design for impact spindle rotation, providing longer service and less maintenance.



Thor Wrench

The new Thor wrench weighs 6 $\frac{3}{8}$ lb and is 6 $\frac{1}{16}$ in. long. But the combination of an extra-large air motor with 6,000 r.p.m. free speed and an exceptionally-compact impact mechanism are stated to make the tool harder hitting and faster driving, with shorter work cycles.

The model 024 is designed for $\frac{3}{8}$ in. bolt size capacity work throughout industry.

Thor Power Tool Co., Prudential Plaza, Chicago 1, Illinois.

For more details circle 133 on Enclosed Return Postal Card.



SAND BLAST the easy RUEMELIN way!

A practical Sand Blast Generator for all types of outdoor cleaning work. Removes rust scale, paint. Cleans bridges, removes laitence from cement. Cleans ready-mix trucks and highway equipment prior to re-painting. Equipped with remote control with deadman valve for stop and start at the nozzle! Wet type nozzles also available if desired. Portable units can be equipped with hi-speed mountings for highway trailing. Write for descriptive bulletin.

RUEMELIN MFG. CO.

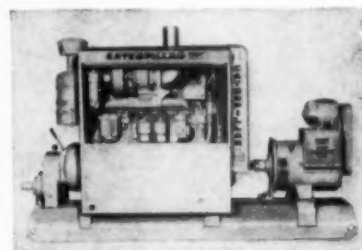
MFRS. & ENGRS. • SAND BLAST & DUST COLLECTING EQUIPMENT
3990 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

AS-9403-1/4

... for more details circle 309 on enclosed return postal card

Power of Crushing Plants

The Caterpillar D337 (Series F) electrical and mechanical drive unit combines the advantages of both types of drive for crushing plants by bringing together the portability of mechanical drive for primary and secondary crushers and electricity for conveyor and screen operation.



Cat D337 Drive Unit

A clutch-controlled Cotta 2 to 1 reduction gear delivers mechanical power at the rear of the engine, while a modified Caterpillar self-regulated, constant voltage generator is mounted at the front, allowing either crushers or conveyor to run without the other.

The diesel engine that powers the new unit is rated at 230 brake hp at 1800 rpm. Full advantage is taken of the extra power provided by a turbo-charger, which uses otherwise waste gases to drive the impeller. The gen-

erator produces 60 KW of 240-volt, 3-phase current.

Caterpillar Tractor Co., Peoria, Ill.

For more details circle 134 on Enclosed Return Postal Card.



Vickers Hydraulic Pump Series

For Heavy Truck Steering

A new vane type hydraulic pump specially adapted for steering systems of heavy-duty trucks is announced by Vickers Incorporated. New design incorporates integral flow control and pressure relief valves to provide optimum performance at all engine speeds while avoiding necessity for mounting extra valve unit.

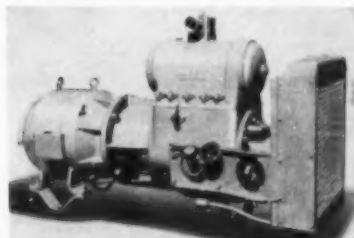
This new series is designated the Vickers V200 series with Integral Flow Control. Nominal rated capacities are 5, 8 and 11 gpm at 1200 rpm. All sizes are available with controlled flow rates of 2, 4, 6 and 7 gpm at relief valve setting of 750 or 1000 psi.

Vickers, Incorporated, Detroit 32, Mich.

For more details circle 135 on Enclosed Return Postal Card.

Rotary Compressors

A new line of Davey tank-mounted rotary compressors in 2-3 and 5-hp. models has been announced.



Davey Tank-Mounted Compressor

Known as Davey Hydrovane Rotary units, these operate at 100 and 200 p.s.i. They are specifically recommended for service stations, automotive repair shops and general industrial applications.

Outstanding features include freedom from vibration and extreme quiet-

ness of operation. The manufacturer states that they are very easy to install and do not require special compressor rooms or foundations. Units are completely enclosed. There are no belts or couplings. Users have their choice of vertical or horizontal tank mountings.

Industrial Division, Davey Compressor Co., Kent, O.

For more details circle 136 on Enclosed Return Postal Card.

Stationary Compressor

An entirely new group of industrial stationary compressors, identified as Davey Hydrovane Rotary, are available in 20 to 125 h.p. sizes, operating at 12 p.s.i.



Davey Hydrovane Rotary

Features include extreme quietness of operation and freedom from vibration. Units are lightweight, compact and do not require special foundations and machinery rooms, easy to install and operate, they are offered with air or water-cooled oil coolers with compressors completely enclosed.

The 40 h.p. unit illustrated is 68 in. long, 30 in. wide, and 39 in. high. It weighs 1365 lb.

The Davey Compressor Co., Kent, O.

For more details circle 137 on Enclosed Return Postal Card.

Concrete Power Buggy

An entirely new model of the White-man concrete power buggy which allows its operator either to walk behind or ride on a fold-down platform is now available.

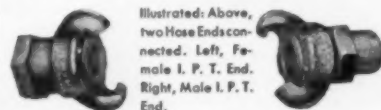
Known as the "Walk or Ride" power buggy, it is compact, light weight and extremely maneuverable. It is designed to travel over narrow, light runways, onto elevators, and through doorways as narrow as 31 in. Capacity is 10 cu. ft. of concrete. Its operating speed is up to 5 mph. Featured is a positive-control dumping mechanism
(Continued on page 125)



"AIR KING" Quick-Acting Universal HOSE COUPLING

FOR COMPRESSORS, ALL TYPES
OF AIR TOOLS, WATER, OIL
AND SPRAY SERVICE

This versatile coupling is built along plain, rugged lines to assure long, trouble-free service under severest working conditions.



Illustrated: Above, two Hose Ends connected. Left, Female I. P. T. End. Right, Male I. P. T. End.

The "Air King" will reduce operating costs wherever quick connections are required. Locking heads are identical for all sizes of hose or threaded ends, permitting the coupling of any two sizes of hose within the "Air King" hose end size range, or coupling to any pipe up to 1" by use of the male or female threaded ends. Heads are locked by pressing together and applying a quarter-turn. A patented Safety Locking Device eliminates all risk of the coupling coming apart. Available in bronze or rustproofed malleable iron, in sizes up to 1".

The "Air King" is made to established standards for couplings of this type and is interchangeable with other similar makes.

Also available in 4-Lug style, Hose and Female I.P.T. Ends only, in 1 1/4", 1 1/2" and 2" sizes.

DIXON
Valve & Coupling Co.
EXPORT DEPARTMENT
1010 SCHAFF BLDG.
PHILADELPHIA 2, PA., U.S.A.

NEW A-W ROLLER-COMPACTOR*

Three states prove that machine makes large savings possible

Deep penetration vibratory compaction and static weight surface rolling can now be accomplished in a single pass by the new A-W Roller-Compactor. On-the-job operation of this dual machine in Oklahoma, Louisiana and Pennsylvania has shown that it can make significant savings in man and equipment-hours.

The original test in Pennsylvania, which led to State approval of the machine, was carried out on a highway relocation job near Harrisburg. Preparation of the roadbed required straight excavation, with no borrow. Largest fills were 25 ft. After grading and soil compaction, stone for a 10-in. thick base was put down in a single lift. All the stone passed a 4-in. screen, 85-100% a 3½ in. Following spreading and initial compacting with the A-W Roller-Compactor, the stone was choked with screenings, 100% passing a ¾-in. screen, 85-100% a No. 4 screen, 10-30% a No. 100.

In this operation, the static weight of the roller (10 tons) held the stone in place while the deep, penetrating action of the vibrating shoes quickly filled the voids with screenings. No auxiliary rollers were necessary.

Engineers of the Pennsylvania De-

partment of Highways testing laboratory checked the job with inspection holes to determine if the screenings were evenly distributed throughout the thickness of the stone base and if the stone itself was firmly keyed together. This check, plus measurements based on the yield needed to compact 1 cu. yd. to the required 10-in. depth, showed that the new machine had done a job exceeding the minimum requirements. The engineers then recommended that it be approved for highway construction work in Pennsylvania.

Time studies on this job showed a saving in man and equipment-hours of better than 25% compared with methods then employed which used a single-purpose vibratory compaction unit followed by a separate 3-wheel, 10-ton roller. It was estimated that a contractor using the A-W Roller-Compactor on stone base could reduce his compaction bid by 10¢ per sq. yd.

Spectacular results were also obtained with this machine in on-the-job operations in Oklahoma and Louisiana. For complete test details and for technical information on the A-W Roller-Compactor, see your nearby A-W distributor or write to us.

COST ANALYSIS OF A JOB IN OKLAHOMA

Equipment	No. of lifts required	Rolling time per lift (hr.)	Equipment time (total hr.)	Cost per hr.	Total cost per mile	Savings
Sheepsfoot roller and two pneumatic tire rollers	9	8	216	\$12.50	\$2700	—
A-W Roller-Compactor	4	11	44	\$12.50	\$550	\$2150

This cost analysis of compaction work on soils and stabilized gravels in McCurtain County, Okla., reveals the remarkable cost reduction made possible by the A-W Roller-Compactor. Additional savings resulted because (1) Less water was required for sprinkling—the deeper lifts used with the A-W retained moisture better during compaction; (2) the roller-compactor method required only one machine and operator instead of several pieces of equipment with an operator for each; (3) motor graders and water wagons could be used more efficiently, because they could prepare material ahead of the compacting area without having to stand by for compaction of each 2-in. lift.

*Patents applied for



Austin-Western

CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes



CUTS HIGHWAY BUILDING COSTS



Dual-purpose A-W Roller-Compactor serves both as vibratory deep penetration type compactor and static weight roller type surface compactor for stone, gravel and soil subbases used in the construction of highways and run-

ways. Shown in use on a highway relocation job near Harrisburg, the machine has been approved by Pennsylvania for complete compaction of stone base aggregates up to 10 in. thick on highway construction in that state.

... for more details circle 238 on enclosed return postal card



STODY 1030

**A new, low-cost hard-facing electrode
that excels in POSITION WELDING!**

Here's a new Stody hard-facing rod especially made to fulfill several "musts"! *Stody 1030 is unusual in its all-position weldability!* This means easier, faster hard-facing on much larger equipment...equipment which has to be hard-faced in the yard or on the job...equipment which can't be positioned to facilitate a down-hand welding setup!

TOP WEAR RESISTANCE within its price class! Stody 1030 fits between Stody Self-Hardening and Stody 21 in wear qualities, favoring the latter. It satisfies all requirements where good abrasion resistance is essential, at the same time saves several cents per pound.

EXCELLENT COMPRESSIVE STRENGTH adapts Stody 1030 to such applications as roll crushers; also sides, lips and teeth of power shovel buckets; drag lines and clamshells; carrying scraper blades, runners, etc.

APPLICATION—Either AC or DC, with a choice of straight or reverse polarity on DC. $\frac{3}{16}$ " rods weld at

140-220 amps, $\frac{1}{8}$ " rods at 225-275 amps. Straight polarity induces very fast burn-off and minimum penetration. Deposits set up rapidly, easily holding edges of welds. Spatter is negligible; overall application efficiency is approximately 78%. No slag covering results, makes easy multiple passes. Complete size range from $\frac{3}{32}$ " to $\frac{1}{4}$ ".

Try Stody 1030 on your next job — test its position welding advantages and wear resistance...make extra savings with its low cost!

Literature on Stody 1030 is available from your Stody Dealer (check the Yellow Pages of your phone book) or write direct.

SEE OUR BOOTH NO. 617 AT THE
WELDING SHOW, APRIL 15-17, 1958

STODY COMPANY

11908 E. Slauson Avenue, Whittier, California

... for more details circle 314 on enclosed return postal card

ROADS AND STREETS, February, 1958

New Products

(Continued from page 121)
that permits placing the concrete neatly and accurately.

Whiteman Manufacturing Co., 13020
Pierce St., Pacima, California.



Whiteman Power Buggy

For more details circle 138 on
Enclosed Return Postal Card.

World's Largest Feeder

An "Amsco" feeder, believed to be world's largest was recently completed by Stephens-Adamson. It is designed to receive ore and stone from bins or hoppers, feeding it to conveying and crushing facilities.



Amsco Feeder

This machine is for use at Union Miniere du Haut-Katanga, Belgian Congo, Africa. It will handle copper ore, feeding it to primary crushers in a new plant. The capacity is 550 tons per hour; the dimensions, 72 in. wide, with 46 ft. centers, and 10 ft. high. A similar feeder was built by S-A for the same mining company in 1948.

Stephens-Adamson Mfg Co., Aurora, Illinois, USA.

For more details circle 139 on
Enclosed Return Postal Card.

Immersible Motor

A new motor for submerged operation is designed for close-coupling to agitators or pumps in sewage sumps, chemicals, water and abrasive industrial oils. In pump applications this flange-mounted motor eliminates many connecting components such as intermediate bearings, couplings, shafting, special bases, etc., since the motor shaft



Louis Allis 1-hp Immersible Motor

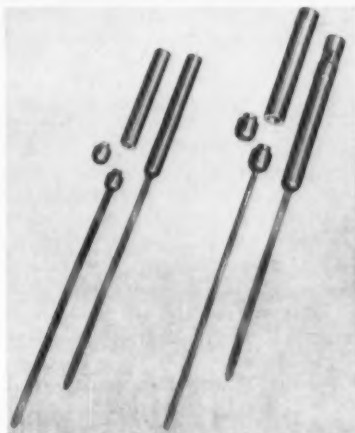
is directly attached to the impeller.

Features include leak-tight construction, neoprene breathers, oil-filled at factory, waterproof cable connection, compact design and corrosion-resistant parts. Available in ratings from 3/4 to 40, both single and polyphase. Ask for Bulletin No. 2300.

The Louis Allis Co., Dept. P, 427 E. Stewart St., Milwaukee 1, Wis.

For more details circle 140 on
Enclosed Return Postal Card.

Close Work Vibrator



Dart Sabre Vibrators

A new device to vibrate concrete in extremely confined areas has been developed by Dart Manufacturing Co. These "Sabre" blades come in varying lengths and attach readily to Dart vibrators. Light in weight (17 lb.), they are engineered of high grade spring steel for long life. Operating up to 10,000 rpm at high cycle or 14,000 rpm at 60 cycle, the slender blades easily offer full force, amplitude and frequency for close work in prestressed concrete or in any restricted area where normal vibrators cannot do the job.

Dart Manufacturing Co., 1002 South Jason St., Denver, Colo.

For more details circle 141 on
Enclosed Return Postal Card.

Mixer Has New Features

A new all-weather water system and added hopper refinements are among the new features of the 1958 "Transcrete" truck mixer. The water system has two major improvements for better operation. A new design, longer-life water pump has been added. The pump has a new ceramic seal for leakage protection and longer trouble-free operation. The other change is placement of water controls at open end on mixer.

The hopper has been made even more rugged for longer life. Redesigned supports offer maximum rigidity with minimum overhang. The mixers are available in 5 sizes, 4 to 7 yd. with separate engine drive and 4 sizes, 4 to 7 yd. with truck engine drive.

Construction Machinery Co., Waterloo, Iowa.



Transcrete Truck Mixers

For more details circle 142 on
Enclosed Return Postal Card.

Improved Core Drill

The Model "JS" Core drill is a new development designed with a low center of gravity and wide skids to offer maximum stability when drilling in rough terrain. Power is by a 134-cu.-in. 30-hp liquid cooled gasoline power unit and has a 6-volt electric starting system. It incorporates an integral 20-ft. aluminum derrick and optional cut head. The drill is offered with either an "AW" or "NW" 24-inch feed hydraulic swivel head capable of handling the new Diamond Core Drill Manufacturer's Association's "W" series drill rods.

Penndrill Mfg. Division, Pennsylvania Drilling Co., 1201 Chartiers Ave., Pittsburgh 20, Pennsylvania.

For more details circle 143 on
Enclosed Return Postal Card.

PORTABLE UNITS

(Continued from page 97)

in big, hard boulders, with an average crushing ratio of about 45 percent, the company selected a Pioneer 151-PRL primary unit, and a companion apron feeder. These permit all big rocks to be sent through the primary jaw before they can enter the 45-VE portable.

The 45-VE was purchased new and set next in the line, so that it can size the incoming material and get rid of it at high speed. Vibrating screen decks equipped with water jet washing were installed next, so that all materials could be pre-wetted, then rough washed. There is also some separation of sizes here, sand dropping into a screw type sand washer and dehydrator. Aggregates pass into a log washer. The sand is stored by a Pioneer elevating belt conveyor; the aggregate is sent to vibrating washer screens for final rinsing and sizing into two products.

This basic thinking has proved sound when put into action. Operating ten hours a day six days a week, the plant often has turned out 1,400 tons, and has averaged well over 1,300. All shipment of material is by Autocar and Reo trucks and semi-trailers, which haul as much as 45 tons per trip. Sand is loaded by a 2½-yd. dragline; rock aggregates by a Michigan 175-A tractor-shovel.

Gradation control of the various sizes of material is under rigid supervision of Michigan state highway department inspectors. Gradation tolerances for various materials are as tabulated.

Michigan Specifications for Concrete Aggregates

Material	Size Screen	Percent Passing
Sand	¾-in.	100
	No. 4	95-100
	No. 8	65-95
	No. 16	35-75
	No. 30	20-55
	No. 50	10-30
10-A Concrete Aggregate Rock	No. 100	0-10
	1½-in.	100
	1-in.	95-100
	½-in.	35-65
4-A Concrete Aggregate Rock	No. 4	0-8
	2½-in.	100
	2-in.	95-100
	1½-in.	65-95
	1-in.	10-40
	½-in.	0-20
	¾-in.	0-5



● The 151-PRL primary portable unit, used at the head end of this all-Pioneer system, did all initial crushing of rock.

The flow plan has been arranged in a north-south direction leading from the primary through the first washing unit, with sand storage continuing in that direction. Rock aggregates make a 90-degree transfer turn to the east, where they emerge from the primary washer, and move up a Pioneer 30-in. stacker conveyor to the surge bins. In passing through the system, the flow is as follows:

Pit-run material is loaded by a 2½-yd. dragline, serving a fleet of Fords with 6-yd. dump bodies. By installing a 4-in. centrifugal pump in a dragline-excavated sump, the water table has been lowered about 15 ft. This has opened up thousands of yards of extra raw material which otherwise would have to be excavated under water. Under the previous ponded condition, large boulders too big to pass through the plant could not be seen. Some cobbles are 3 ft. in diameter. When these are found, they are carefully rolled aside and wasted.

Dump trucks pass pit material to the apron feeder in the 151-PRL primary. This push-button controlled device places raw material into the 2436 jaw crusher unit, which is powered by a GM Detroit 6-71

diesel. The crusher jaws are set at 4-in. clearance, sufficient to handle all pit material.

Jaw throughs are lifted by a short 30-in. conveyor to a dump point over a surge hopper, tapped by a plate feeder. This feeder then places the rough-crushed material to a conveyor, leading up to the third deck of the 45-VE Duplex portable gravel plant.

The 45-VE takes power from two sources. A GM 6-71 drives the plant crushers through a direct jackshaft; the remainder of the plant is electric motor driven with power generated by a nearby GM 4-71 diesel electric plant.

For making sand and Michigan 4-A and 10-A materials, the third deck on the 45-VE is equipped with a 2-in. screen, which scalps off all oversize particles and drops them into the 1036 jaw crusher on the 45-VE. Emerging from this unit, jaw throughs join roll crusher throughs, move to the bucket wheel, and are hoisted in closed circuit again to the third deck, where they are re-circulated until everything meets specifications. There is a chip screen on the second deck, and a 1 in. square mesh

(Continued on page 130)



Simple,
low-cost
CORRUGATED
metal pipe

Culvert on New Kensington, Pa. by-pass. Fabricated from USS Galvanized Corrugated Culvert Sheets by United Steel Fabricators, Inc., Wooster, Ohio. Installed by Adam Eidemiller Construction Company, Greensburg, Pa.

stands up under heavy loads!

Structures made from USS Galvanized Corrugated Culvert Sheets provide a permanent, speedy and economical means of handling road and highway drainage problems. They readily absorb the impact and vibration of modern traffic and can carry heavier loads than rigid-type structures.

These advantages, plus the fact that corrugated metal culverts are

not subject to breakage, require no maintenance, cost less to install and are easy to ship and handle, make them ideal for most drainage applications.

For larger drainage structures

USS AmBRIDGE SECTIONAL PLATE is available in a complete range of standard sizes to satisfy design requirements for various types of ter-

rain and waterway openings. These flexible structures with their heavy-duty corrugations can resist extremely large externally applied loads.

For detailed information, ask for a copy of our 28-page catalog. Send your request to American Bridge Division, U. S. Steel Corporation, Room 1801, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS GALVANIZED CULVERT SHEETS

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

... for more details circle 328 on enclosed return postal card



7-1004

UNITED STATES STEEL

SALT OF THE EARTH!

In Low-Cost, All-Weather Roads

... and in sub-base stabilization
for modern HIGH-SPEED highways

Salt — long accepted for low cost stabilization for all-weather township and county roads is today finding a gigantic new market in sub-base stabilization for the most modern high-speed highways. "Under-Slab" salt stabilization provides a firm but resilient, high density, water-tight support for the rigid pavement above.



The Mixing Method — The Pulvi-Mixer

Virtually no other method today is employed for high quality mixing in salt-stabilized farm-to-market native soil or gravel roads. The Seaman-Andwall Pulvi-Mixer provides the greatest advantages in low cost sub-base stabilization:

1. The Pulvi-Mixer mixes and blends the salt to complete depth and at the same time blends coarse aggregates and fines so that — after compaction the mix is closely knit, voids are well filled and aggregates securely interlocked.
2. Usually the Seaman-Andwall mixing process costs about a cent a square yard — often less; little enough to build a

lasting, low-maintenance all-weather road — and certainly little enough to protect the huge investment involved in major highway construction. The cost is far less, production is greater and uniformity higher than with the old fashioned multiple pass operations with a blade.

Spreading

The most efficient spreading equipment for the original salt application is found to be either the Century HY-4 or the Century HY-8. Both are tailgate spreaders, operate hydraulically with only one man (the truck driver) and both meter salt with high accuracy.

Recommended for compaction

immediately after the Pulvi-Mixer operation is the highly maneuverable Seaman-Andwall 7 to 20 ton Pneumatic Compactor. Compressive forces are "straight down" so the Seaman-Andwall Compactor prevents displacement of materials, scuffing, shearing or raveling of the surface.

Studies of salt stabilization costs show that this type of construction runs as low as \$400.00 per mile.

If you would like to have a Bulletin on Salt Stabilization, send a post-card to Seaman-Andwall Corporation — Dept. R-229 — Milwaukee, Wisconsin. We will get complete information and literature to you promptly.

SEAMAN-ANDWALL CORPORATION, Milwaukee 1, Wis., U. S. A.

... for more details circle 320 on enclosed return postal card



Allison TORQMATIC Transmission—patterned after the automatic drive that made its fame in giant earthmovers—is now available in a complete line of GMC trucks—with V8 or six-cylinder power—single or tandem axles—conventional or dual-purpose models

Nothing like a GMC Money-Maker with Allison TORQMATIC “Drive”!

“Drive” is right. Even when you have to work them “all out”—through the most “impossible” muck and mire—hauling top-capacity loads—these GMC Money-Makers refuse to bog down. After all, Allison Transmissions have been putting that kind of “go” in giant earth-movers for more than 10 years now.

You’ll save time, too. For there’s a 14.8 to 1 reduction for positive, easy starts—every time. And with four driving ranges that give you six forward speeds—you get just the amount of truck-propelling torque you need, when you need it—*automatically*.

Your brake maintenance is cut. Thank a built-in Hydraulic Retarder that gives you positive

“engine braking” at the touch of a pedal. That’s a real safety factor as well—especially with a hefty load behind you.

Your engine and drive-line are constantly protected from damaging shock. That’s assured by the torque converter—working with a direct-drive lockup that engages in every gear for real fuel economy. And there are *two* power take-off openings.

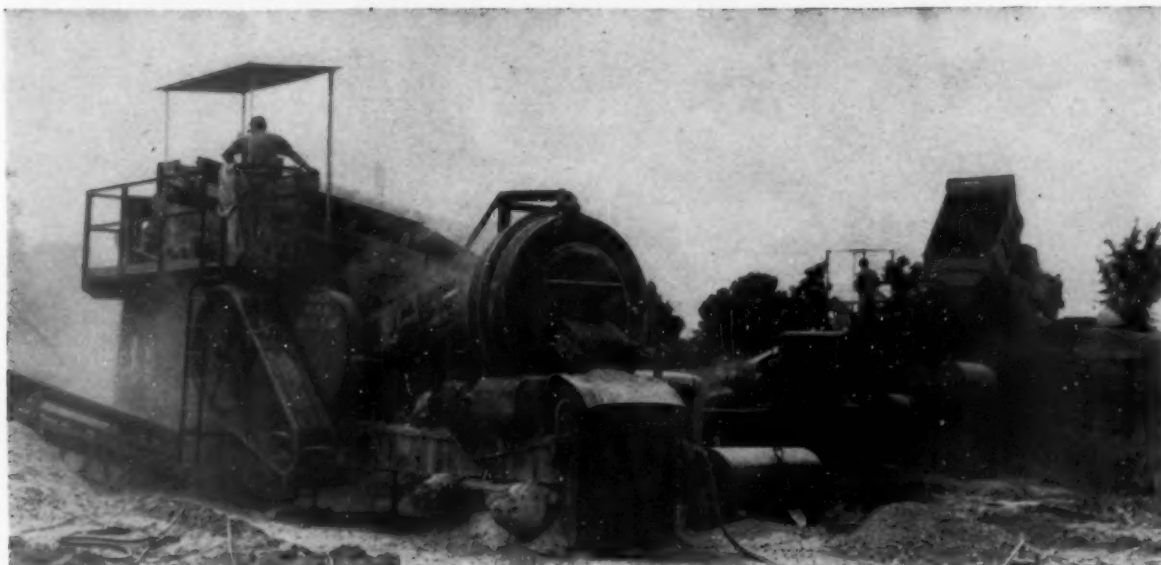
All these Allison TORQMATIC benefits are now available in GMC Money-Makers blanketing the entire 19,500-46,000 GVW range. Get the rest of the facts and figures at your GMC’s dealer’s!

GMC TRUCK & COACH—A General Motors Division

GMC—America’s Ablest Trucks

GMC Money-Makers available in models from 1/2 to 45 tons

... for more details circle 275 on enclosed return postal card.
ROADS AND STREETS, February, 1958



● The Pioneer 45-VE Duplex unit turns out material at high speed after picking it up from the 151-PRI. primary plant component.



● Rock passing the primary unit goes up this conveyor to be dumped into the 45-VE Duplex plant. Secondary crushing and primary sizing are functions of the 45-VE in this set-up.



PORTABLE UNITS

(Continued from page 126)

on its first deck.

Regardless of how the pit might fluctuate, the plant can handle any situation. If excess sand develops, an entire screen deck is available in the 45-VE for its removal. There is sufficient screening capacity on the incoming third deck, permitting rock suitable for the roll crusher to be pulled and sent, via the bottom deck and bucket wheel, to the top deck and rolls. The traditional jaw bottleneck on glacial gravel crushing has been eliminated in the 45-VE Duplex.

All material leaving the 45-VE emerges over the Pioneer 30-in. stacker conveyor, which discharges to a double deck 4 x 12 ft. vibrating screen washed by water jets. Sand drops through these screens to a screw-type sand washer. After it is cleaned of all clay, silt and other decantable material, it is sent out to storage. A standing period of 48 hours is customary before shipment, so that excess water can drain away through the ground below.

Rock aggregates from the vibrating screen emerge from a side delivery into an Eagle log washer. From that point they pass up a 30-

(Continued on page 134)

- A good look at the raw material right where it comes out of the pit. Big, hard boulders in this glacial deposit have to be handled and crushed.



New advantages for truck owners introduced in all-new **Dodge Power Giants for '58**

Power, payload, economy and styling features make Dodge 4-way leaders of low-priced 3

Recent introduction of the new '58 Dodge *Power Giants* brings truck owners a series of the most outstanding advances in Dodge truck's 40-year history.

In power, for instance, Dodge offers three new *Power Giant* V-8's that provide up to 234 hp. . . as much as 24% more than other low-priced makes. These extra-powered engines can take it easy under normal loads . . . keep going longer, too.

Payload capacities are up to an all-time high. Chassis construction features the elimination of excess weight while actually increasing strength. You get as much as $\frac{1}{3}$ more payload capacity.

. . . for more details circle 258 on enclosed return postal card

ROADS AND STREETS, February, 1958

When it comes to economy, Dodge sweeps the field because of its exclusive Power-Dome V-8 engine design that reduces harmful carbon deposits. This improves gas mileage . . . practically eliminates the need for major engine overhauls.

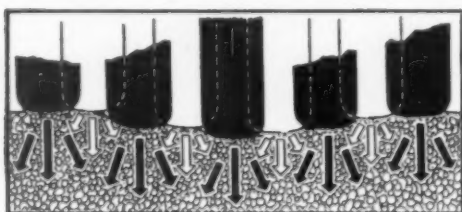
Dodge styling gives truck owners a real prestige bonus. Striking dual headlights, massive new grilles and luxury cabs are exceptional highlights.

All in all, truck owners would be well advised to check into the '58 *Power Giant* line-up before replacing or adding units. These Dodge trucks are definitely four-way leaders of the low-priced three.

DODGE Power Giants



How oscillating wheels can save you untold street maintenance costs...



See the flow of compaction effort that the Bros Self-Propelled roller with torque converter drive provides for street seal coating, resurfacing and shallow lift compaction...

Here's how it is helping cities throughout the country make great savings in street maintenance costs:

- With full oscillation of all wheel pairs to provide uniform compaction, the BROS SP-54 helps "key" and "lock" aggregate materials tightly in the base course to prevent various pavement failures.
- Wheel oscillation of this roller also kneads the asphalt into a tight, solid surface, eliminating hairline cracks that would otherwise turn into

surface breaks. Very important, too, rubber tire rolling correctly imbeds the wearing course chips *without* crushing them.

- Besides such proven advantages, the BROS SP-54 offers these time-saving performance features: a torque converter drive provides smooth, easy handling and eliminates "tipping" of chips when starting; it also lessens drive line strain.

- Full-reversing type transmission with shuttle gear permits rolling in either direction without shifting; turn arounds are thus eliminated.

- Infinite speed range from 0 to 18 mph; positive chain drive to both rear wheel pairs; 50 HP engine and smooth, hydraulic steering provide fast, proper compaction results that you can't get from any other roller. See a BROS Distributor or write us for full information and/or a demonstration.

Find out, too, about the complete BROS TEAM. With the SP-54, the BROS Preparator and Roto-Mixer make the perfect combination for low cost street construction. The Preparator (in-place materials reducer) reduces native over-size materials and old blacktop to proper roadbed sizes. The Roto-Mixer stabilizes and blends the base and wearing course materials to improve load bearing values.



ROAD MACHINERY DIVISION
BROS INCORPORATED

(Formerly the WM. BROS BOILER & MFG. CO.)

1057 Tenth Ave. S.E. • Minneapolis 14, Minnesota



... for more details circle 247 on enclosed return postal card

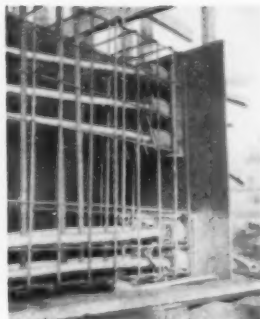


South Fork Bridge over South Fork of Holston River, Kingsport, Tenn. Owner: Ridgefields, Incorporated. Contractor: Blount Bros. Construction Company, Montgomery, Ala. Consulting Engineer: Mr. H. T. Spoden.

450-Ft. Prestressed Concrete Vehicular Bridge Uses 53 Miles of Roebling Prestressing Wire



Grouting 90-foot girders.



Detail of end reinforcement cage, Freyssinet end anchorages, metal sheath and Roebling wire—90-foot girder.

Spanning the South Fork of the Holston River at Kingsport, Tennessee, this new bridge embodies the Freyssinet cable method of prestressing. These Freyssinet cables—as well as end anchorages, sleeves, grids, and jacking and grouting equipment—were supplied by the Intercontinental Equipment Company, Inc.

Span lengths are 85, 90, 100, 90 and 85 feet, for a total length of 450 feet. Roadway width is 20 feet between curbs. Prestressing units consist of 8 cables of 18 wires each in the 100-foot span, and 7 cables of 18 wires each in the 85- and 90-foot spans. Wire diameter is 0.196 inches.

Roebling is now equipped to deliver cable assemblies composed of a specified number of wires cut to the required length and assembled in flexible metal hose ready for placement in the forms of post-tensioned members.

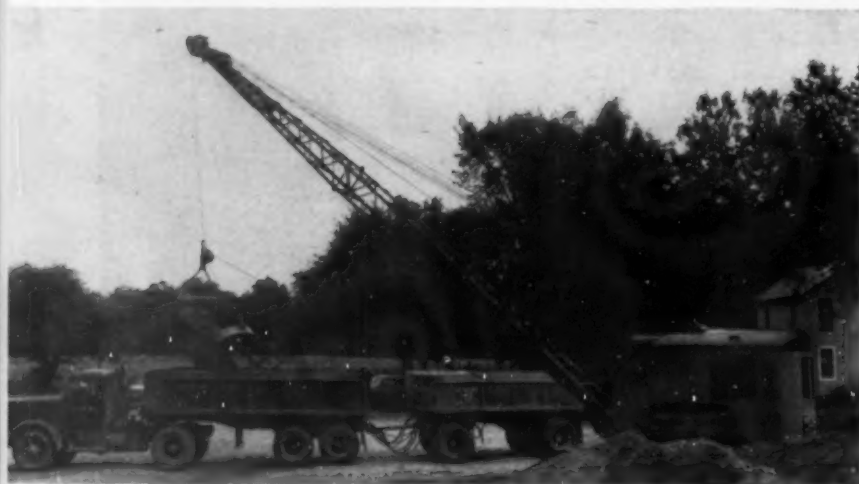
This facility is, of course, in addition to the standard 7-wire, stress-relieved strand for pre-tensioned bonded prestressed concrete and galvanized strand assemblies for structures where design loads are heavy or require long tensioning elements, and stress-relieved wire for all types of parallel wire cables for post-tensioning.

Further, Roebling is always ready to furnish you with information and assistance on *any* phase of this remarkable and widely growing construction method. By writing to Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey, you can avail yourself of prestressed concrete information on whatever aspect most concerns you.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation





● Concrete aggregates are loaded out to large double tandem haulers by Northwest crane.



● Michigan 175-A tractor-shovel loads one of the small sizes of aggregate from a stockpile near the plant.



PORTABLE UNITS

(Continued from page 130)

in. conveyor run to the Pioneer screen decks which set over a pair of 23-hd. surge bins. The top deck of this screen is equipped with a 1-in. mesh, which retains 4-A aggregate, and passes the 10-A size. The bottom deck has a $\frac{1}{4}$ -in. slotted mesh, which retains all materials but passes all cloudy water from the material. The sized, washed aggregate then drops down to separate surge bin storage. Dump trucks haul from there and put the aggregates in stockpiles for shipment.

The pit is so difficult that regular maintenance of the plant is vital. An index of the toughness and abrasiveness of the rock is the company's experience last year, during the height of the 1956 season, when the company took 60,000 tons from the same pit. The rock was so hard and abrasive that it was necessary to replace a moving jaw plate every two weeks. The 45-VE's jaw plates have lasted better than that, but there has nevertheless been some jaw replacement in the first 50,000 tons. And regular roll crusher maintenance with Abrasoweld and Ranite BX hardfacing rod is done every weekend, or at other times when the plant is down for any reason.

Conveyor runs have all been equipped with positive wiping devices, so that rock cannot pass over the head pulley and get back under the idlers. Art Fleming, who manages the field operation of the plant, is a man who believes that maintenance cannot possibly be overdone. It always pays dividends.

The total plant output of 1,400 tons per day will match the paving capacity of any modern highway paving spread in the nation. By getting an April start in 1957 with the new equipment, and working steadily six days a week, Pickitt & Schreur successfully stockpiled much material out ahead of the contractors.

● This shows the plan layout from the end of the line; looks back through toward primary end of plant in far background.



Cone Bros. Contracting Co. is using the following Caterpillar-built equipment on this job: DW21-No. 470 LOWBOWL Scrapers; D9, D8 and D7 Tractors and a No. 12 Motor

Grader. The DW21 units have a capacity of 25 cu. yd. heaped, 18 cu. yd. struck. Their LOWBOWL design pays off in high production at lower cost per yard.



"We have observed other machines and have come to the conclusion that our Caterpillar-built rigs have much less down time. We have found them more dependable. We're 100% Caterpillar on this job."

Charles E. Bailes, Jr.,

Superintendent of Cone Bros. Contracting Co., Tampa, Florida.

Five DW21-No. 470 LOWBOWL Scrapers spearhead the Caterpillar line-up used by Cone Bros. on a 23-mile, \$1,500,000 road building project in Florida. One section, running 12 miles from U. S. 41 at North Naples to Immokalee, involves moving about 500,000 cu. yd. of sand and marl. In extremely heavy going, the five DW21s hauled 120 loads in 10 hours over the two-mile round-trip. Each DW21 unit carried 21 cu. yd. per load. Here you see one of them being push-loaded by a D9.

CAT LOWBOWL Scrapers for lower cost per yard.

As Superintendent Bailes observed, Caterpillar-built rigs "have much less down time" and "are more dependable." These are factors in high production. And in the case of Cat Scrapers, there's another big factor—exclusive LOWBOWL design. On job after job, matched against current models of other makes, Caterpillar LOWBOWL Scrapers have handled material at lower cost per yard. This is a fact, not a claim. It is completely documented by data covering road conditions, materials handled, load times, haul times, cycle times, bank yards per trip as well as the real payoff—cost of dirt moved per yard, the only true measure of a machine's productive capacity!

Your Caterpillar Dealer has proof. All these job facts are on file at your Caterpillar Dealer's. Have you seen them? They'll give you a good idea how Cat LOWBOWL Scrapers can lower your earthmoving costs. Your dealer

will be glad to show them to you. He'll be glad to demonstrate, too—just say when and where, he'll be there!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

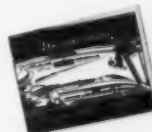
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THE LATEST, MOST COMPLETE INFORMATION ON THE NEW HIGHWAY PROGRAM — FREE

Here in one booklet is all the latest information on the new highway program. Find out how, where and when the money will be spent; standards for the new freeways; final routes of the Interstate System. Everything you need to know to share in the greatest construction job in history.

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● Bethlehem bridge railing offers real safety and "see-through" beauty coupled with ease of field erection. Here railing is being completed on a central Pennsylvania bridge.

Steel Box Bridge Railing Easy to Install

BETHLEHEM STEEL COMPANY has developed a new bridge railing which is simple to erect, attractive and equipped with safety features. The first installation has just been completed in central Pennsylvania.

Steel box channel rails are supported on malleable iron intermediate and end posts. Box channels and posts arrive at the bridge site ready for installation; no welding or riveting is required, just a few bolts and screws must be tightened. The rails are furnished in any length from 7 to 20 ft. Intermediate posts are spaced on 10-ft. cen-

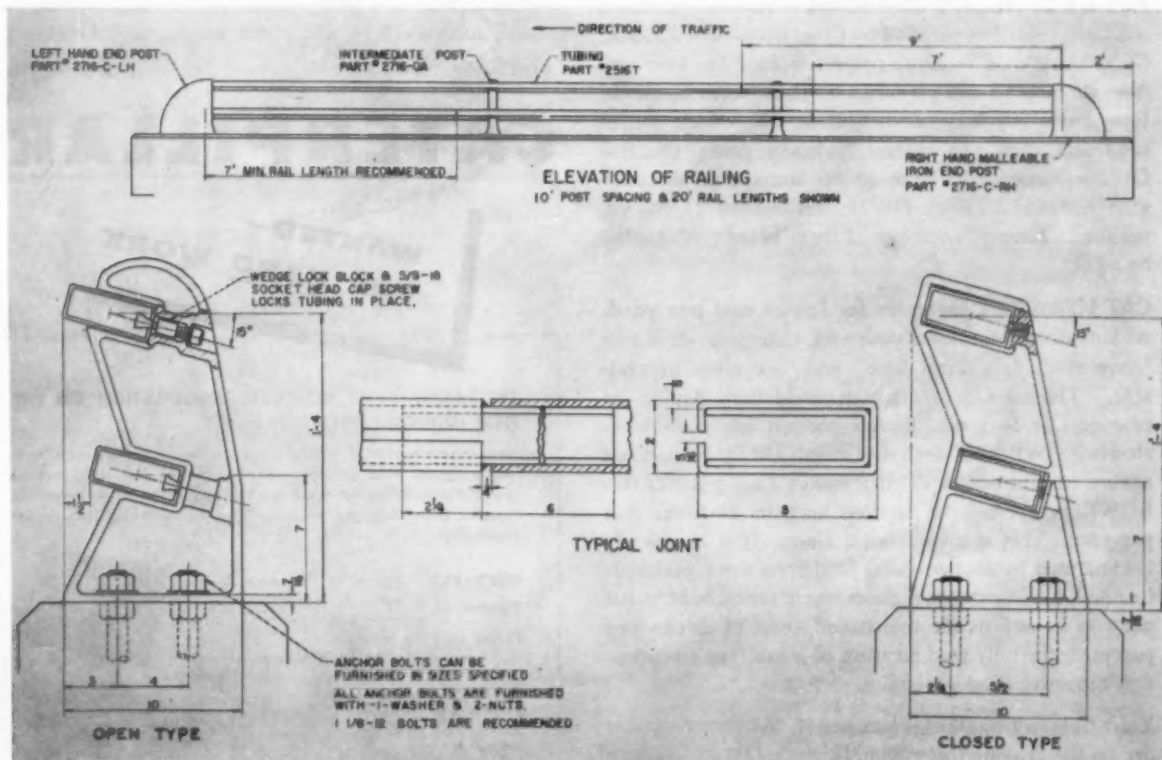
ters. The 2 x 5 in. box channel rails are cold formed from $\frac{1}{8}$ -in. steel sheet, galvanized to conform with ASTM Spec A-123. Each channel is fitted with an $\frac{8}{16}$ -in. steel sleeve inserted at one end to form the male connection. Easy "slip" insertion is all that is required to connect rails in the field.

Intermediate and end posts are malleable iron castings. Like the rails, posts are galvanized in accordance with ASTM Spec A-123. Posts are connected to the bridge parapet by four $1\frac{1}{8}$ -in. diameter anchor bolts set in the concrete.

Each bolt is furnished with two nuts and a washer, the extra nut simplifying the setting of the bolt; it also guarantees that the bolt will be perpendicular in the concrete.

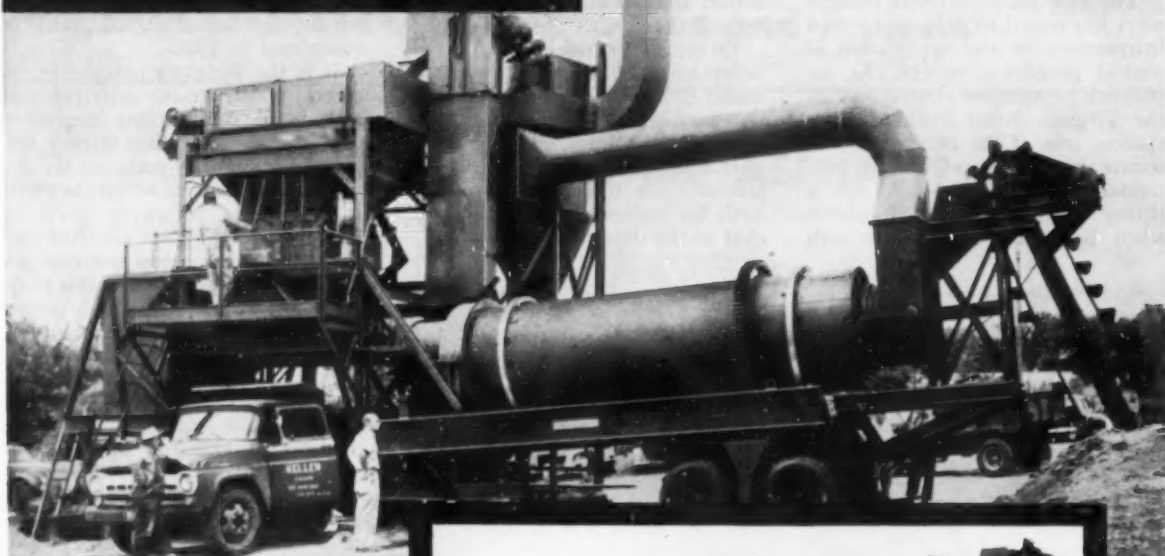
Bolts are secured to the top concrete form prior to placing the concrete. Anchor bolt is drawn tight by the two nuts, one above and one below the form. After the concrete has set, the top nut is removed and the top form slipped off. Bolts must then be perpendicular to the surface of the parapet.

The new bridge railing is made in two standard types—open and closed—with 3 styles in each type.

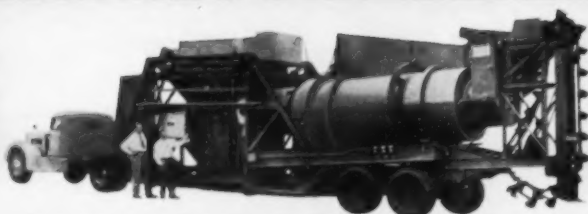


Structural details of steel box railing.

ON THE JOB TODAY!



**... tomorrow
on the way!**



STANDARD

Trailer Mounted ASPHALT PLANTS

For MORE PROFITS on low tonnage hot-mix jobs, see the STANDARD Model T-M Trailer Mounted Asphalt Plant, the biggest batch-type plant on wheels, completely self-contained in its own trailer frame . . . in 2,000, 1,500, and 1,000 pound batch capacities.

Entire plant wheels to the job, can be set up and placed in operation in as little as eight hours. Operators in the field report the Standard Model T-M Trailer Mounted Asphalt Plant produces as much as 60 to 80 tons per hour of hot mix.

STANDARD Model T-M Trailer Mounted Asphalt Plants offer the same rugged design features as the larger STANDARD Model R-M Semi-portable Asphalt Plants, including: Super-Lift Dryer with Saw-Tooth Lifters . . . Heavy Duty Hi-Speed Mixer . . . Simplex Pushbutton Batching Control . . . Positive Control of Liquid Asphalt . . . Complete Accessibility. Field proven for a number of years, the Model T-M is designed for extreme portability and top capacity. Here's the largest, most economical Trailer Mounted Batch Type Asphalt Plant in the world.

PUSH BUTTON ERECTION

Exclusive Standard power-hoist automatically raises the mixing unit from transport to operating position in less than one hour.

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ASPHALT PLANTS

... built to do a better job!

STANDARD STEEL CORPORATION

General Offices & Plant, 5003 Boyle Avenue, Los Angeles 58, California
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The rugged, massive Standard R-M Asphalt Plant packs more power, with extra capacity, over-sized vibrating screens, elevators, and dryers; larger bearings, heavier shafts and giant sized hi-speed pug-mill. This gives you the toughest and most economical asphalt plant in the world. Available in 2,000 to 8,000 pound batch capacities.

ROTARY DRYERS • KILNS • COOLERS • ASPHALT PLANTS

New Contract Shut-Down Procedure in Virginia

The Virginia department of highways has issued to field offices new instructions on the application of partial shutdown orders. As explained to member contractors by the Virginia Road Builders Association, one of the effects of these instructions is to permit the contractor to request and receive a lifting of the partial shutdown when he plans work which will

exceed his dollars-per-day ratio. This, in effect, charges the time on the basis of dollars-per-day or the actual number of days used, whichever is the lesser.

Under additional instructions all delays caused from right-of-way and under unavoidable causes are to be documented by the inspector at the time of occurrence. This will enable a complete record of the contractor's lost time to be available both for his own information and that of the department officials.



Look at the uniform triple-lap coverage and straight edges you get with a "Black-Topper"

You can see the results of Etnyre's exclusive triple-lap coverage (spray from each nozzle overlapping *two* other sprays) in the unretouched photograph above. Road builders have learned that single-lap coverage is utterly unsatisfactory . . . double-lap coverage somewhat better . . . but triple-lap coverage is the complete answer to hitting rough aggregate from all possible angles for complete coverage.

Moreover, by turning the end nozzle as indicated, you get a sharp line edge which adds the finishing touch to the job. With this accurate alignment, you can spray right up to the edge of curbs. Such dependable operation and uniform, accurate distribution are typical results you can expect from an Etnyre. Investigate today — find out how soon a "Black-Topper" can be delivered to you to handle your work faster, better, more economically!

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"Black-Topper"
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SHELF ROAD

(Continued from page 56)

which began in 1949 and will be completed in 1960.

It is the Bureau's practice in its direct construction activity (regional) to call project engineers into the Denver office during the winter, where they make up the design on the projects which they will supervise the following summer. The contractor's force credited Buford Irion, the project engineer on the job, with the fact that this project was workable under such potentially adverse conditions. One of the traffic safety features engineered into the project was the installation of a 12 ft. berm or shoulder along cut slopes 20 or 30 ft. above the roadway, intended to catch slides and falling rocks.

The U.S. 26 project is under the general supervision of the Denver office of the Bureau of Public Roads, through Albert C. Spann, division engineer with headquarters at Cheyenne, Wyoming.

For the contractor, the president of this firm, Wm. N. Woodall, spent most of his time on the project.

Fly Ash and Slag Paving Mix Studied

Fly ash and slag aggregate as paving ingredients are being studied through the cooperation of the University of Illinois and the Illinois division of highways.

Illinois power plants alone produce 1½ million tons of slag and fly ash a year and then pay to have it hauled away. Civil engineering instructor George W. Hollon estimates that this material could make 210 miles of 34-ft road annually.

Lime is used as the cementing agent in this research. Four % of waste lime, is combined with 36% fly ash and 60% slag. Water must be controlled within 1%, according to this study's findings. This mixture is unaffected by outdoor temperature changes. It can be worked for up to 16 hours after mixing, and although it is slower to season than portland cement mixes, it continues to gain strength over a much longer period. Because it wears away easily, it must be surfaced with black top.

Hollon claims the mixture's particular value is for building secondary roads, city streets and parking lots. A 1200-ft. trial section of highway shoulder has been laid near Chicago on Harlem Ave.

Bituminous Problems and Projects

WHAT PENETRATION ASPHALT?

SINCE THE BEGINNING of "hot mix" as a distinct pavement type the question has been asked what is the proper grade (or penetration) asphalt to use. The answers to this question are still varied. There have been changes in thinking concerning it, but nowhere in the literature are we aware of any comment or study which provides a completely rational answer to this question from the engineering viewpoint. Consequently some discussion of the matter in the light of more recent knowledge may have interest.

Essentially the choice lies in the range from 40 to 300 penetration, which has been shown by experience to have possible merit. Generally speaking, it is between a harder or softer asphalt, with modern day practice classifying the 70/80 or 85/100 penetration grades as the former and the 120/150, 150/200, or 200/300 as the latter. Asphalts harder than these are infrequently used in pavements, and an even softer material (described as SC-6, but essentially utilizing the hot mix process) is likewise occasionally encountered; but there are objections to both, as can be implied from the discussion following.

What are the factors which need consideration in determining the binder penetration? We believe they are the following: durability, flexibility, cohesive strength, resistance to film displacement, compactive resistance, and asphalt room. Other factors will merely be corollary or should not be given weight in the usual situation.

Durability is determined by the asphalt film thickness, film viscosity, and voids in the pavement. The latter can be generally controlled, but the asphalt film thickness in the normal mix is a function of the binder viscosity. This point was first made by the writer in 1928, later discussed and confirmed by Prevost Hubbard, and the full scientific background for this position is given in the recent work of

Views and Comments

By H. G. Nevitt

Dr. Mack. Essentially there is a limiting desirable film thickness. Any asphalt used in excess of this amount will either be displaced into the voids or prove harmful, adding to the lubricating effect while diminishing the binding strength.

From this standpoint harder asphalts are superior since they permit the use of a greater asphalt volume with a number of beneficial results. Their higher film viscosity likewise reduces the rate of oxygen diffusion through the asphalt, this being one of the controlling factors in the oxidation of the binder.

Durability is generally determined by the resistance of the asphalt to hardening, which shows up in pavement cracking. It has been repeatedly demonstrated that there is a limiting hardness in the binder below which point the pavement will develop permanent cracks. This limiting hardness probably varies somewhat for different asphalts and is certainly dependent upon the ductility characteristic. Asphalts showing high ductility at low penetration will show superior resistance to cracking; but this benefit is usually offset by their higher temperature susceptibility, so that the limiting normal penetration of such asphalts is about the same as those of lesser cohesiveness and ductility. This limiting consistency or asphalt hardness seems to lie between 30 and 20 penetration, and it is certainly unwise to contemplate the use of a material which will drop below 30 penetration in the early use years despite the fact that many pavements continuing to give excellent service do show lower

values.

The idea of flexibility does not seem to be given consideration by many engineers, but it is a point which we think important and have stressed in many of our discussions. An extremely dense pavement with very thin asphalt films has strength but it is likewise brittle. Such a pavement does not adjust itself to necessary changes in support to the extent desirable. A design of this type abandons one great merit of asphalt pavement; namely, its flexibility and ability to readjust itself to changing support conditions. The thicker the asphalt film the greater the tendency to show flexibility, both elastic and plastic; consequently the more desirable the pavement.

It is true that very thin films of low cohesiveness, such as are obtained from road oils, likewise readily adjust due to actual movement in the pavement components; but except in the case of major level changes to which all types of asphalt pavement will eventually adjust, this type of internal pavement movement in our opinion is less desirable than the elasto-plastic movement which provides the usual hot mix pavement strength (not merely in the surface course but likewise in the structure as a whole) for carrying loads.

● This last point of total road strength is particularly important, as was brought out in the Washo test. A highly cohesive mat greatly strengthens the entire structure, carrying questionable bases through periods of distress. The cohesive strength and general ability to do this is greatly enhanced by the use of stronger, hence usually harder, asphalt. This whole matter of cohesive strength, designing to produce it, and methods of testing and control to assure it, is a subject which is just beginning to get the attention it merits.

The benefit of harder asphalt in resistance to film displacement needs little discussion. Experience

has shown that resistance to stripping materially increases as the asphalt viscosity increases. Probably both the moisture diffusion rate and its tendency to result in film displacement are better resisted by the harder films.

Compactive resistance is a term seldom heard in discussing the selection of the binder grade, but it is definitely a factor. Both rolling and later traffic will continue to densify the pavement, though at a steadily diminishing rate until a practical equilibrium point is reached or closely approached. Provided this equilibrium condition does not result in void overfilling it is a very desirable one, supplying the maximum stability and cohesion possible from the particular aggregate and asphalt used. It is commonly known (and studies in states such as Virginia are giving quantitative values for the process) that this compaction proceeds more rapidly with softer films, due either to the binder used or the climatic conditions. Obviously the softer asphalts greatly aid in this action, particularly where the process goes on at a very slow rate for most of the year due to either low temperatures or light traffic or both.

Finally, we have the matter of asphalt space. Pavement mixtures should be sufficiently dense to provide strength, but nevertheless have enough space between the aggregate particles after compaction to give room not merely to the necessary asphalt binder but likewise some air voids. In theory this can be done very satisfactorily; that is, the grading can be adjusted so that the void content finally obtained is just right for the optimum amount of asphalt plus the air voids desired. In practice this adjustment is not always feasible with the materials and processing equipment conveniently at hand. At times either a rather unsatisfactory grading must be used or there will be a tendency for insufficient mineral aggregate void space. In such instances, which should not be too frequent, the thinner films possible with soft asphalt may have some advantage. However, we wish to emphasize that this point should not normally be a factor, and should certainly be controlled where possible. The theory occasionally advanced that the substitution of mineral particles for asphalt, with a resultant low asphalt content though very dense mixture,

is a desirable (since economical) program, fails to give due attention to the requirement discussed above.

It will be noted that improved stability from harder asphalt was not listed as a consideration in the usual case. We believe this is a very important point. If the aggregate gradation does not give stability, the proper course of action should be its improvement rather than the use of hard asphalt for this purpose. For the stability so contributed by the asphalt is a questionable factor, greatly depending upon the rate of loading and other considerations. At the present time our test techniques do not always distinguish between the sources of pavement stability, and the only safe course is to obtain it from aggregate interlock. One serious objection to many design methods is that they do not properly differentiate between stability resulting from aggregate friction and that resulting from binder viscosity.

● This does not mean that there are not circumstances under which the harder asphalts are not indicated to provide the necessary pavement resistance. A typical case is in sand asphalt pavements, where stability in the base course through filler addition may greatly increase the expense. In these instances where the design techniques have been evaluated for the conditions by experience, some reliance may be placed on the asphalt stability contribution; but to the extent that such is practicable, this should not be a dominant consideration in selecting the grade of asphalt despite common practice in this direction in some areas.

From the above considerations, the pros and cons of softer versus harder asphalts can be formulated. The softer material gives more leeway for hardening during life before the brittleness or cracking stage is reached, and it will compact more rapidly under traffic, thereby developing the full pavement strength at an earlier date. The softer binder likewise has more protection against winter cracking due to extremely cold weather. On the other hand, the early flexibility and durability due to the softer binder tends in due course to be offset by the more rigid pavement resulting from the thinner asphalt films obtained, so that in its final condition the soft asphalt pavement is less able to withstand overloading without permanent cracking and hardens at a faster rate, even though the

penetration has a greater distance to go.

In contrast the harder asphalts, while compacting more slowly, give a stronger, more flexible mat in time because of the thicker films which can be used. If the asphalt is the type which does not harden unduly, so that the brittleness stage is not reached in the normal life of the pavement, these thicker films and the greater flexibility will undoubtedly produce a more lasting pavement, with greater functional strength.

● Obviously the local conditions should be the determining factor between these offsetting advantages and disadvantages. Where the traffic is light, the climate is cold, and there is little probability of heavy traffic developing in later years, the softer asphalts may have advantage. In all other situations, the harder material seems more desirable. From the practical standpoint it would appear that present trends are in the majority of cases correct. These can be summed up as the use of 70/80 penetration for very heavy traffic, 85/100 for normal high count traffic pavements, and the softer grades used only in areas where low traffic counts along with prolonged cold weather make them desirable under present conditions.

This last is a very important point. If the most modern compaction is provided in sufficient amount, as described by us in a recent issue, the benefits of the softer grades are practically eliminated. Except for some allowance for climate—particularly where there is practically no season of high pavement temperature—the heavy grades with their thicker films, greater durability, and other advantages should be used, because the ultimate compaction (or something approaching it) can be provided at the time of construction, and the resulting pavement will then approach the same density as will that using softer asphalt. It therefore seems likely that in eventual designs the harder grades will be used almost entirely since the benefits from the construction described are so great that it seems bound to become a general practice.

NEXT MONTH

Progress

in Asphalt Technology



Four more improvements in the Barber-Greene Finisher

Four new improvements give the Barber-Greene Finisher faster speed, faster travel, lower maintenance cost and increased power.

Improving the Barber-Greene Finisher is not something new. Scores of major improvements have been embodied in its design since it was first released to the field 20 years ago.

These improvements have been incorporated without spectacular announcements or fanfare. They have all been based on vast experience. In fact, the Barber-Greene Finisher is now paving its second million miles, which is many times the mileage and tonnage records of all other asphalt paving machines in the world combined.

These are all proven, sound improvements developed from experiences in laying every type of mix, in virtually all conditions. Machines embodying this group of design changes are now in production and are designated as the Model 879-B.

Latest improvements include:

NEW TRANSMISSION—Provides both higher operating and travel speeds. The new transmission still provides 12 forward speeds giving a wider range of operation.

HIGHER SPEED TAMPER—This new design permits faster laying speeds and reduces maintenance costs.

NEW CRAWLERS—Precision-drilled pads and larger pins will further decrease maintenance costs.

NEW POWER UNIT—20% more power. This means pushing even bigger trucks, handling even steeper grades, greater reserve for high altitude, and higher speeds of operation.

Note To Barber-Greene Finisher Owners

These latest improvements, as well as many previous improvements, can be incorporated in your old machine. Necessary parts are now made up in kit form for each modification separately. A folder describing the various kits is available.

Barber-Greene

AURORA, ILLINOIS, U.S.A.



97-3-F

CONVEYORS...LOADERS...DITCHERS...ASPHALT PAVING EQUIPMENT

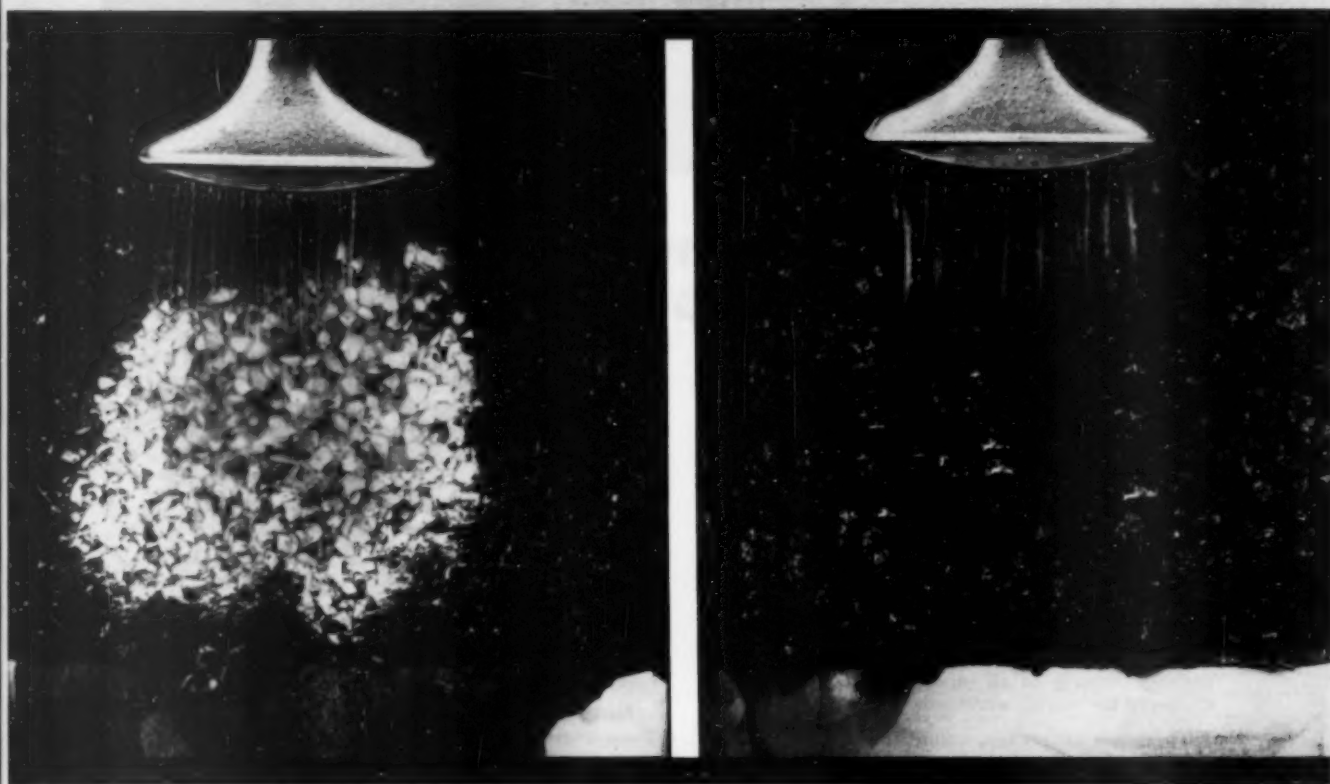
ROADS AND STREETS, February, 1958

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141

Announcing the NEW CATIONIC BITUMULS

- Coats "Treacherous" Aggregate
- Protects Your Cold-Mix Pavements and Surface Treatments Against Early Rains



These unretouched photographs taken in our laboratory clearly show the remarkable ability of CATIONIC Bitumuls to coat and hold silica-crystal chips, and to stand up under early rainfall. Here are two samples of cold-mix materials. They are identical with this exception: the sample on the left was mixed with a conventional road emulsion; the sample on the right was mixed with new CATIONIC Bitumuls. No anti-stripping additive was used. Both samples were allowed to cure for 10 minutes; then subjected, as shown, to equally-metered showers of water. Results: the conventional emulsion almost completely washed off, while the CATIONIC binder still coats the silica chips and holds them firmly in position.

Now—with new CATIONIC Bitumuls—you can treat “hard to coat” aggregate—damp or dry—fast and effectively.

CATIONICS represents a startling new departure in the making of asphalt emulsions. New CATIONIC Bitumuls because of its versatility and “native” affinity for all aggregates enables you to use damp, slick, “hard to coat” gravels and other hydrophilic aggregates.

This means you can build—

Better travel plant mix pavements
Better surface treatments

And, you get these better pavements at *lower cost* because with CATIONIC Bitumuls you can use many cheaper aggregates that are unsuitable for use with other binders.

Because the product sets quickly, construction damage resulting from sudden rains is reduced to a minimum. In addition, the fresh paving mixture can be quickly rolled and opened to traffic. All of these benefits mean an extension of the working season into marginal weather conditions that normally would prevent emulsion paving work.

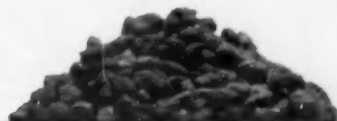
Storage, handling and application are much the same with CATIONIC Bitumuls as with conventional emulsions; however, care must be exercised in the preparation of storage facilities and application equipment. CATIONIC Bitumuls is available from certain of our strategically located plants. Our engineers are ready to discuss projects which you may wish to set up for trials of this new product with specific types of aggregate.

YOU NAME YOUR

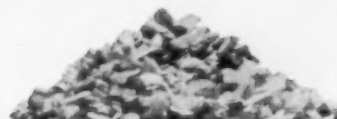
“HARD TO COAT” AGGREGATE—NEW

CATIONIC BITUMULS WILL HANDLE IT!

MARYLAND
REFERENCE GRAVEL



OREGON
CRYSTAL SILICA



PRINCE GEORGE COUNTY,
MARYLAND, GRAVEL



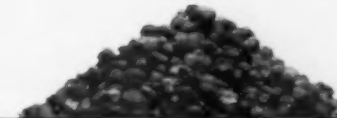
CALIFORNIA
MARBLE CHIPS



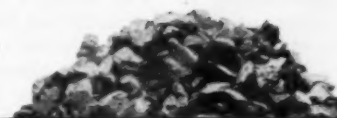
PENNSYLVANIA
REFERENCE STONE



OHIO
REFERENCE GRAVEL



MASSACHUSETTS
RHYOLITE



Here are representative samples of the types of aggregate generally regarded as “difficult” by design engineers. New CATIONIC Bitumuls readily treats all of these. When cold-mixed in a mechanical paver CATIONIC Bitumuls gives thorough stone-coating. There is no stripping in the screw; no drag under the screed. Fast initial set and rapid cure even in deep placements assure early stability; almost immediate rolling.

On Surface Treatment work with slick, hard to coat, (hydrophilic) gravel or stone chips, the new CATIONIC Bitumuls gives you more in terms of performance than other binders: rapid set; earlier rolling; faster acceptance of traffic; better cover-stone retention.

Call your nearest American Bitumuls office for information on CATIONIC Bitumuls.



American Bitumuls & Asphalt Company

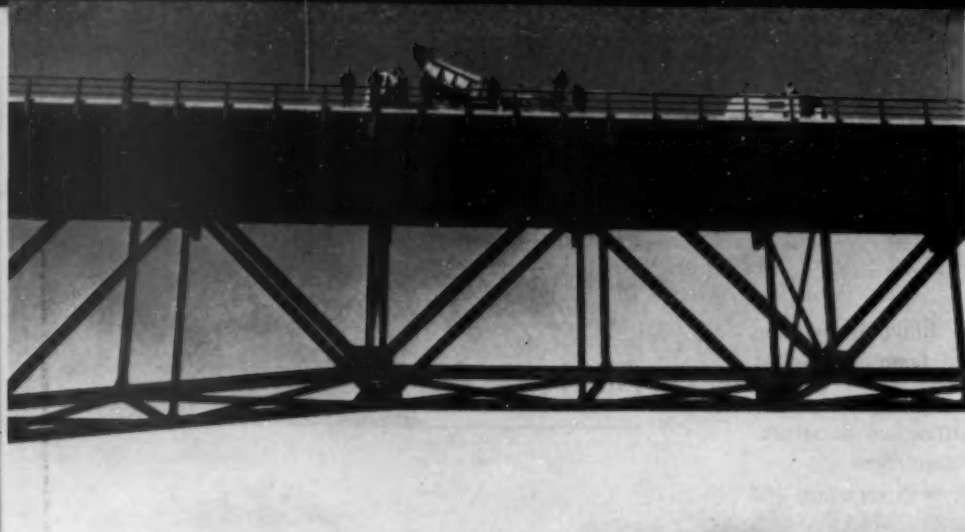
320 Market, San Francisco 20, Calif. Perth Amboy, N. J.

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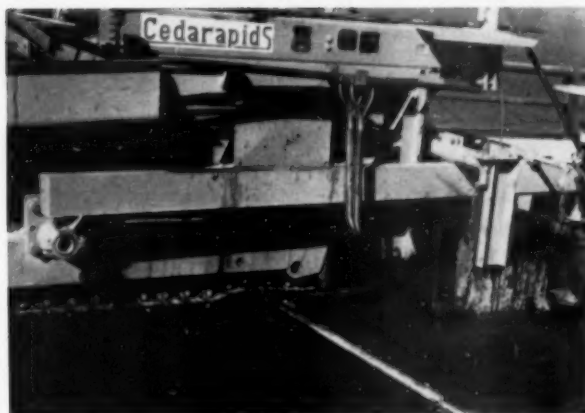


● The bituminous paving crew of Thornton Construction Co. gets up in the air on their Mackinac Bridge job. Here they are shown paving the approach spans.

● The action of the oscillating track rollers is shown above. They allow the paver to pass over the 1½-in. high steel expansion joints without disturbing the screed. The opening in the expansion joint in the foreground is still protected with masking tape.

Smooth Deck for Mackinac Bridge

(See cover scene)



THE NEW MACKINAC STRAITS BRIDGE, opened late in 1957 (just in time for the hunting season), is the world's longest suspension span system, and its center span is the world's second longest bridge span. This bridge has another distinction—one which will be appreciated by motorists who have historically expected a bridge pavement to be less smooth riding than the roads approaching it. The bridge's asphaltic concrete pavement was laid to exceptional smooth tolerance.

The bridge deck for this almost-5-mile-long structure contains 90 expansion joints. Each joint has steel lips which had to be made

exactly flush with the pavement surface. The 1½ in. mat of hot mix asphaltic concrete, therefore, was required to be spread and rolled with an exceptional accuracy of thickness control, in order to match joints without waviness.

In placing the 10,000 tons of mix on the bridge including approach spans (plus another 10,000 tons of mix for approach roadways), Thornton Construction Co., of Hancock, Mich., foresaw the need for special accuracy of mix placement, with the possible need for costly hand raking. The firm selected the new Cedarapids Bi-

tuminous Paver, whose oscillating track rollers permitted passage over the joints without disturbing the screed. Hand work was virtually eliminated.

The paver was first operated at 22 ft., then at 32 ft. per min. after a trial run. This relatively low speed was deemed practical, despite the high potential placement rate of this unit (102 ft. max.), due to the need for hand work around drains and other special features.

Just previous to paving, the expansion joints were covered with masking tape, to keep material from falling down into the joint. After the paver had passed over the joint excess material was reformed the steel by hand.

The entire bridge and approaches provide two lanes of traffic each direction with a 2-foot wide mountable center mall. On the suspension bridge section only the two outer lanes are paved, with steel grating roadway floor used in the center two lanes. The outer lanes consist of 4½-in. grating filled with lightweight portland cement concrete and topped with 1½-in. of bituminous. The center lanes are open grating to reduce weight and for aerodynamic reasons.





Complete 120 T.P.H. Plant with Mineral Filler System. Mounts at Grade with Slab Foundation.

Only Bollard Plants offer Features like these for Higher Tonnage at Less Cost

Bollard Stationary and Semi-Portable Asphalt Plants, in sizes of 60 to 180 T.P.H., incorporate many exclusive features that step up production, minimize down-time, lower overall costs.

Bollard Plants, designed to specific requirements owe their superiority to forty-one years' experience in the design and fabrication of the finest bituminous mixing plants.

Compare these Bollard features that add up to greater production and profits—

DRYERS: 60"-108" diameter. Staggered flights in drum for better cascading action of material, more efficient exposure to heat. Supports to grade eliminate concrete piers. Combustion chamber, extending inside of shell, prevents distortion. Heavy duty chain and sprocket drive minimizes torque on dryer shell.

TOWER: Hot bin; 4 compartments; 25 to 100 tons total capacity. Hopper bottom equipped with fast opening clam shell-type gates. Weigh box permits loading of 10% greater than rated capacity of mixer.

MIXERS: 2000-6000 lbs. Patented design makes



Improved Mixer Features Longer-Wearing Parts ... Easily Replaced When Necessary.



Section of Bollard Dryer with Trunnion Rollers (Total of Eight).

it possible to replace bolted, not riveted, liners easily and to adjust special long-lasting tips to 16 positions.

CONTROLS: All mixing operations air controlled through solenoid valves for automatic operation. Permits easy installation of Hardymatic or other automatic control system.

AUXILIARY EQUIPMENT includes mineral filler handling and dust collection equipment; coil-equipped storage tanks; jacketed asphalt piping; belt or bucket conveyors; pumps, heating by steam or hot oil.

A Bollard Engineer will be glad to discuss your asphalt plant problem with you. For information, write Dept. RI



BOLLARD Asphalt Plant Division

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ROADS AND STREETS, February, 1958

BIG MADSEN

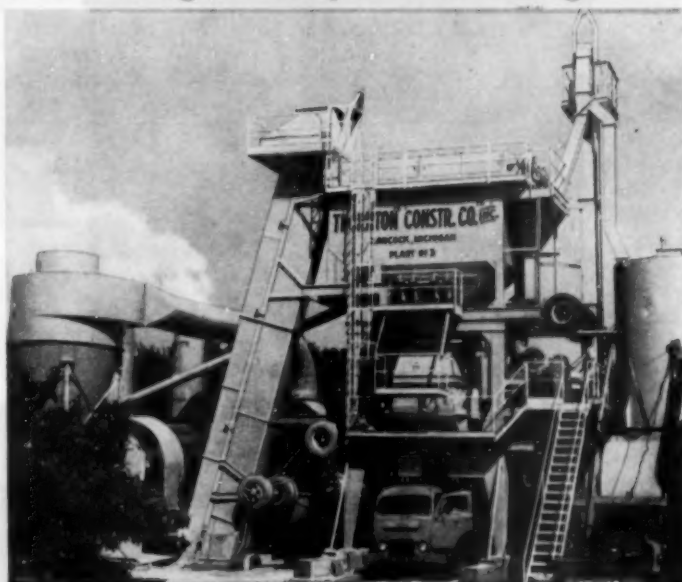
6000-LB. ASPHALT PLANT



THORNTON CONSTRUCTION COMPANY, INC. of Hancock, Michigan used this big MADSEN Model 481 6000-lb. Batch Capacity Asphalt Plant for producing 6400 tons of bituminous concrete mix for the approaches and surfacing of the Mackinac Bridge. Plant is located at St. Ignace, Michigan, about 2 miles from the Bridge.

Ability to turn out big-volume production day-in and day-out together with superior engineering that results in faster production and less maintenance... are important money-making qualities that have made leading contractors choose MADSEN Asphalt Plants.

...handles bituminous mix requirements for approaches and surfacing of World's Longest Suspension Bridge



Let's take a look at some of the MADSEN features built into this THORNTON CONSTRUCTION COMPANY's big MADSEN Plant.

● **FULLY AUTOMATIC OPERATION** (Optional in MADSEN Plants) ... By pressing a single button, operator weighs out aggregates and asphalt — discharges materials into the mixer — dry mixes and wet mixes — and dumps mix into waiting trucks. Unit will recycle as many batches as desired up to 400. Three different specification mixes can be made by merely flipping the selector switch to the mix desired.

● **RUGGED 6000-lb. MADSEN TWIN-SHAFT PUG MILL MIXER** ... Has a capacity of 64 cu. ft. below center line of mixing shafts and a net capacity, level full, of 135 cu. ft.

● **COMPLETE PORTABILITY**...Transport wheel equipment furnished for screen-bin section, mixer-weigh-box section, hot stone elevator and dryer. (Dust collector

and dust washer to be wheel-equipped at later date.)

● **4-COMPARTMENT, 50-TON CAPACITY BIN** ... Exclusive MADSEN design (3 openings in each bin compartment) eliminates segregation and speeds up charging of weigh-box.

● **120 CU. FT. (LEVEL FULL) CAPACITY WEIGH-BOX** ... Has air operated gate, and 4-point lever suspension — roller-mounted so that it may be quickly rolled out of the way for field maintenance.

● **MADSEN 96" x 40' COUNTER-FLOW DRYER** ... Unit is capable of drying upward of 180 tons of aggregate per hour to a .018% moisture content.

● **12-FT. DIAMETER CYCLONE DUST COLLECTOR** ... Equipped with MADSEN Exhauster.

● **MADSEN TRIPLE WET TUBE DUST WASHER** ... Has met air pollution requirements everywhere.



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Ask your MADSEN Distributor for the complete story or write MADSEN WORKS
Baldwin-Lima-Hamilton Corporation, Construction Equipment Division,
P.O. Box 38, La Mirada, California

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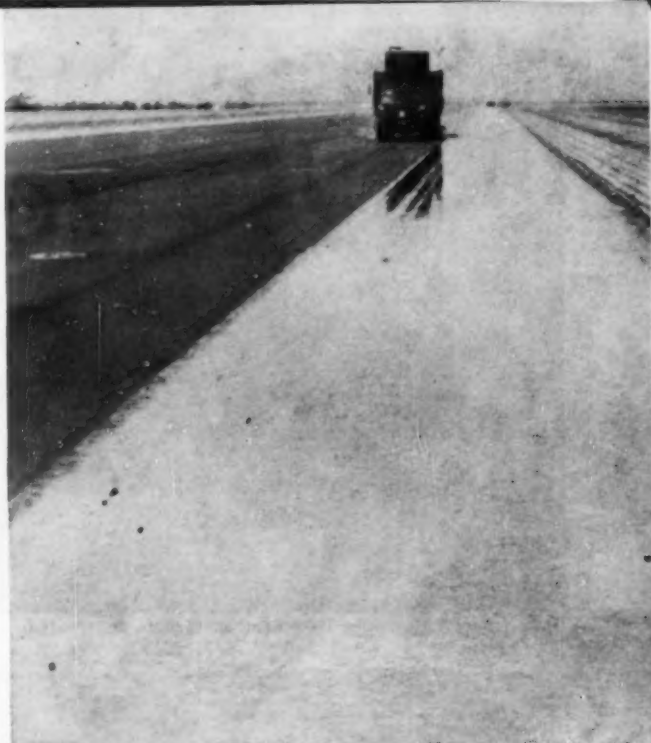
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Tar Rubber Concrete Apron and Its Surface Treatment by New Slurry Method



● First slurry coat being applied.

Review of experience and procedures on pavement at Williams Air Force Base, Arizona, as prepared by William O. Harrell, Civil Engineer, San Antonio, Texas.

EXISTING APRON: This flexible pavement aircraft parking apron, constructed in the shape of a trapezoid, totals 104,200 sq. yd. It was constructed in two stages described as follows:

The first stage was accomplished in 1951. It consisted of compacted 6 in. native soil as a subgrade having a CBR 13; 9 in. of imported select material for the subbase course; 6 in. of stabilized aggregate for the base course; an asphalt prime coat; 1½ in. of asphaltic concrete for the binder course; and 1½ in. of asphaltic concrete for the surface course.

The second state of construction consisted of a tar-rubber concrete surface course applied to the above pavement. Two different manufacturers' products were used as the bituminous binder material. The apron was divided approximately in half along its longitudinal axis so that Surf-a-Seal could be used on the east half and Flint-binder C-2 used on the west half. Thickness of this surface course was 1½ in.

● **Slurry Seal Coat.** A slurry seal coat project was approved at low bid of \$53,782 and placed during

January, 1957, under the FY 57 Major Repair and Minor Construction Program. The project completed and accepted in April, consisted of the following described principal features of work, listed in the order of accomplishment:

a. Cracks over ¾ in. width were grooved, cleaned and filled with a sand-bitumen joint filler mixture tamped and rolled in place.

b. Cracks from ¼ in. to ¾ in. width were to be grooved, cleaned and sealed with a jet fuel resistant joint sealing compound of the cold applied type.

c. All areas covered by oil, grease, hydraulic or brake fluid, and any other foreign substances that would prevent bonding, to be cleaned with a detergent and flushed with water. Just before application of the seal coat the surface was broomed and again flushed with water.

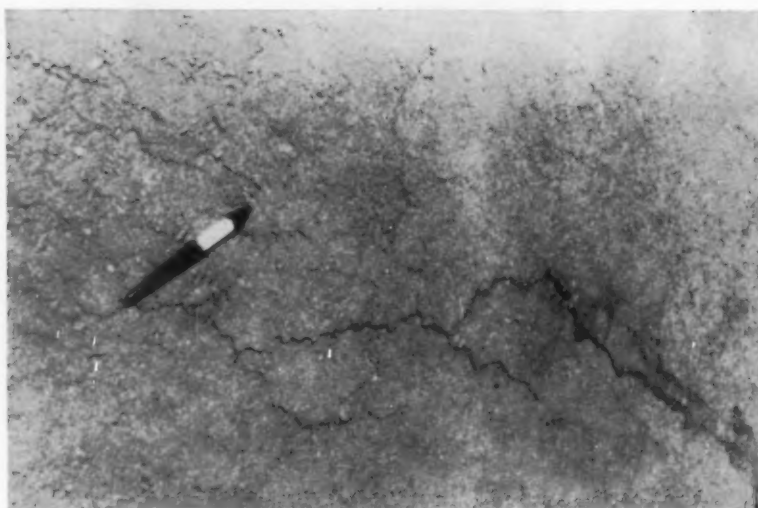
d. A seal coat was applied consisting of a sand-coal-tar-pitch emulsion slurry.

e. The job included painting of apron striping, static ground markers and grid coordinates, and aggregate material. All cracks less than ¼ in. width were filled with the slurry material.

● **Observations:** The pavement surface had failed to the extent that many of the longitudinal construction joints had opened, numerous random cracks developed. The pavement had oxidized to the point where it contained many voids. Some of the random cracks showed slight evidence of a pattern similar to transverse contraction joints in portland cement concrete pavement. Most of the open joints and cracks ranged from ¼ in. to ¾ in. width, with 1½ in. depth.

No evidence of the joints or cracks extending down into the asphalt concrete was found. Considerable areas were soaked with oil and grease, deposited by parked aircraft and refueling vehicles; the depth of penetration was greater than ¼ in. in most areas.

The open joints and cracks were routed and refaced to a depth of 1½ in. with a Tennant machine. The tar-rubber binder had become so brittle that the cutters tore the aggregate loose rather than cutting through it to leave a clean and smooth face. Most of the joints and cracks averaged about 1 in. width before a stable face could be obtained, but in some areas up to 2 in.



● Pavement surface to be treated.



● Prior seal coat application.

All grooves of less than 1 in. down to $\frac{1}{4}$ in. were sealed with a hot-poured jet fuel resistant sealing compound. Grooves greater than 1 in. were filled with a cold-mix tar and aggregate material. All cracks less than $\frac{1}{4}$ in. width were filled with the slurry material.

The specifications called for the oil and grease spots to be removed with a detergent. It was found that the oil spots could not be removed with caustic soda or tri-sodium phosphate. Grinding off approximately $\frac{1}{16}$ in. of the surface with a Tennant machine and priming the fresh surface with a tar material used for coating metal pipe lines did not prove successful. The oil and grease started bleeding through the primer in less than 12 hours. Other primers such as shellac, lacquer, and pavement marking paint were tried without success. Finally it was decided to grind the surface

to provide cut aggregate surfaces that were free of oil and immediately prime the area with straight

Jennite J-16. This proved to be the most successful method. After about 24 hours it was found that oil was bleeding through this primer in only an estimated 10 percent of the areas that were treated.

● *Spray Bar Application.* The specifications had originally provided for application of the slurry seal coat by a spreader box. At the time of preparation of the project it was not known there was a spray type applicator capable of applying a slurry mixture of the consistency desired. The contractor, Jennite Associates, Inc., had developed such a machine, and requested a change in the specifications to allow its use instead of the spreader box. After test panels were established with the spray type applicator, it was determined that a satisfactory slurry seal coat could be obtained by means of this method of application. It was found that the seal coat had to be applied in two or three spray applications to produce the best results.

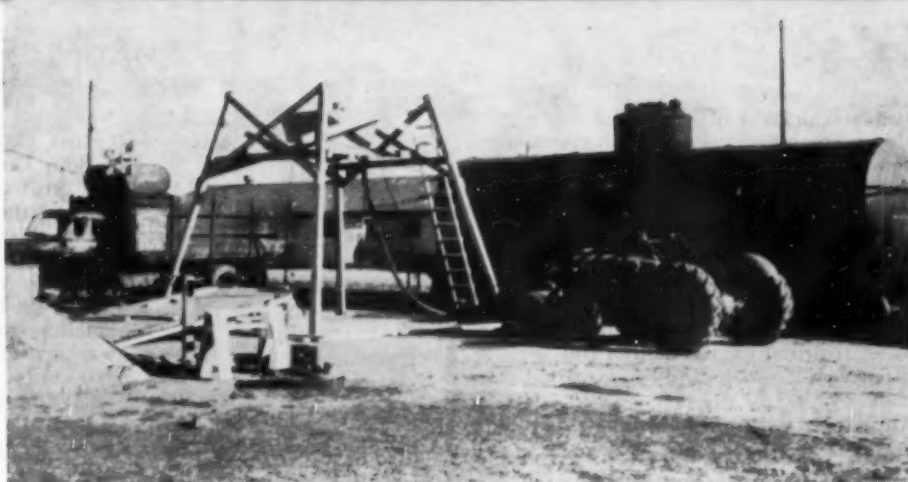
The seal coat was applied by the spray type applicator in three coats in the following described manner. The first coat consisted of 0.1 gal. per sq. yd. of straight emulsion applied to the surface immediately after it had been dampened with about 0.1 gal. per sq. yd. of water. The water was sprayed at 100 psi and the emulsion at 125 psi.

The second coat consisted of a slurry 10 lb. of sand per gallon of emulsion. It was applied at 0.1 gal. per sq. yd. plus the sand content of the slurry, at a pressure range of 10 to 25 psi. After the second coat, joints and cracks remaining unfilled were filled flush with the pavement surface with the same slurry mixture, applied by hand squeegees. The third coat was exactly like the second. The completed work left

EDITOR'S NOTE: The author of this report, W. O. Harrell, was pavement engineer for Crew Training Air Force from the date of its activation in 1952 until it was abolished in 1957. He is now in charge of Planning & Programming of installations facilities, as well as pavement engineering for Headquarters, Continental Division, Military Air Transport Service, Kelly AFB, San Antonio.

The method here described was developed to fill surface cracks, stop further volatilization of the tar, and seal the surface against fuel seepage into the asphaltic concrete base below the tar-rubber concrete. The application here described was reportedly performed to the satisfaction of the officials concerned. As a consequence Air Force Headquarters has prepared a Guide Specification for the procedure.

- Blending and application equipment.



an even sand-bituminous coating slightly over $\frac{1}{16}$ in. thick over the entire apron. All sand aggregate thus was firmly cemented to the pavement surface by means of a full coating of bitumen.

The amount of sand that can be mixed successfully to form the slurry will vary according to the bitumen content of the emulsion product used. Advantage of a slurry seal coat over an application of straight emulsion is that it leaves a coating with enough body not to be easily damaged by average wear and tear. Its other advantage is that it leaves no loose aggregate on the surface to be flown and sucked into jet aircraft engines.

● *Recommendations:* The following recommendations are submitted for future seal coat work on tar-rubber concrete pavements.

a. That no attempt to be made to reface the sides of open joints, or to groove random cracks with a power cutting tool.

b. That open joints and random cracks $\frac{1}{2}$ in. or more in width be filled with a cold-mix tar-aggregate material, and openings $\frac{1}{2}$ in. or less

BID ITEMS ON SURFACE TREATMENT PROJECT

Bid Item	Estimated Quantity
Groove and clean joints and cracks	30,481 L.F.
JFR sealing compound	16,950 lb.
Tar binder mixture	27 cu. ft.
Tar binder material	46 gal.
Seal coat aggregate	120 ton
Coal-tar-pitch emulsion	35,209 gal.
Painting lump sum



● Prior seal applied to pavement.

be filled with the slurry seal coat material.

c. That the surface of oil or grease

soaked pavement be ground to a depth of not less than $\frac{1}{16}$ in. or more than $\frac{1}{8}$ in. to provide new oil-free surfaces of exposed aggregate, and that a primer of straight emulsion be applied immediately in a thickness sufficient to retard any visual evidence of bleeding.

d. That a primer of 0.1 gal. per sq. yd. of straight emulsion be sprayed at a pressure range of 75 to 125 psi on the dampened pavement before application of the slurry seal coat material.

e. That if a spray type applicator is used, it should be *only* for applying the prime coat of straight emulsion and the slurry material when it is to be applied as a seal coat; each course should be sprayed at the rate of 0.1 to 0.2 gal. per sq. yd. of the slurry material.

f. That if a spreader box is used, each course should be applied at an



● Surface texture of two coat slurry applied.

average thickness of $\frac{1}{8}$ in. and on all pavements showing visual evidence of oxidation, longitudinal joint separation or random cracks.

g. That the coal-tar-pitch emulsion should contain from 15 to 20 percent by weight of bitumen (solubility of non-volatile in CS_2) for the weight of the sand contained in each batch, plus the amount of water required for the desired consistency.

American Bitumuls Builds North Carolina Terminal

Plans for construction of a new asphalt storage and distribution terminal at Wilmington, N.C., have been announced by American Bitumuls & Asphalt Company, subsidiary of Standard Oil Company of California.

Scheduled for completion in time for spring deliveries, the new terminal will supply a full line of asphalt and asphalt products for street and highway construction and maintenance. These will include asphalt cements and asphalt cutbacks plus "Bitumuls" emulsified asphalt which will be available from the company's Salisbury, N.C., plant. The terminal is being constructed to meet current demands for asphalt of all kinds in the Wilmington area, as well as to accommodate an anticipated increase in asphalt requirements in the region. It is being designed to provide delivery of materials at proper temperatures for immediate application.

The terminal will receive the basic asphalts from American Bitumuls' own east coast refineries by marine transportation. It will be an added link in the company's plans to step up service to the construction industry throughout the country. The American Bitumuls Company recently completed a new terminal at Bainbridge, Ga., and has also announced a deep water terminal at Savannah, Ga.

Ladder on Boom Speeds Painting of Light Standards

Use of a boom-supported ladder by Henkels & McCoy, contractors, Philadelphia, Pa., has cut the painting of light standards to only 5 or 10 minutes. Application shown here was used on the Ohio Turnpike.

The boom is mounted with a Ford 6-cyl. industrial engine on a Ford truck. The engine powers a turntable which enables the boom to revolve 180 deg. The boom-ladder combination is also used in erecting poles for telephone and illumination work.



● Painting a light standard on the Ohio Turnpike, using boom-supported ladder.

Big Equipment Auction Shows Contractor Confidence

The biggest auction sale of heavy construction machinery in the United States during 1957 was held near Dayton, Ohio, in November.

During a three-day period more than 2,000 contractors and their representatives from every state in the Union, Canada, and Central and South America, spent \$1,800,200 for used construction equipment. The original cost of the machinery was approximately \$3,000,000.

From the moment Percy Ross, Minneapolis, president of the Ross & Ross Auctioneers, Inc., called for the first bid the opening day, attendance was heavy, demand constant, and interest unusually high, despite the adverse factors of the opening of Ohio's hunting season and strong winds that soaked bidders with pelting rain.

The attendance and prices that Ross obtained provoked some eyebrow lifting among a number of contractors and observers who were not participating in the auction. These factors were all the more significant in view of the then tight money situation and the inflationary pressures.

The success of the sale also demonstrated the confidence among contractors of an upswing in heavy construction and roadbuilding during the coming months, according to an auctioneer spokesman.

When Ross sold the last machinery about midnight late Saturday,

November 16, Francis Smalley, Celina, Ohio, president of Smalley & Sons Construction Co., expressed "great satisfaction" with the results of the auction. His company disposed of equipment that originally cost \$3,000,000.

"The over-all prices Ross got were above the average," said Smalley. "The sale on the whole, was up to and better than our expectations."

"We were criticized for planning a sale and told we wouldn't get any prices but we did," said Smalley. "Not only did we get good prices but by having an auction we have saved maintenance and upkeep for the winter, avoided personal property taxes on our machinery, and saved interest and depreciation."

One of the most successful bidders, Felix A. Chapa, Jr., San Antonio, Texas spent more than \$125,000 for crawler tractors, road graders, scrapers and dump trucks. He bid for Guatemalan and Panamanian contractors who will use the equipment on the Pan-American highway project.

Jenks Heads Asphalt Institute

The Asphalt Institute, at its annual membership meeting in New York last week, elected D. Hugh Jenks, Jr., Ashland Oil & Refining Co., Ashland, Ky., to chairman of the board, succeeding Robert O. Wilson, Cosden Petroleum Corp., Arlington, Texas.

J. J. Tumpeer, Witco Chemical Co., New York (Pioneer Products Division), was named treasurer to succeed G. R. Christie, Socony Mobil Oil Co., N. Y., retiring.

Other members of the Executive Committee were elected as follows:

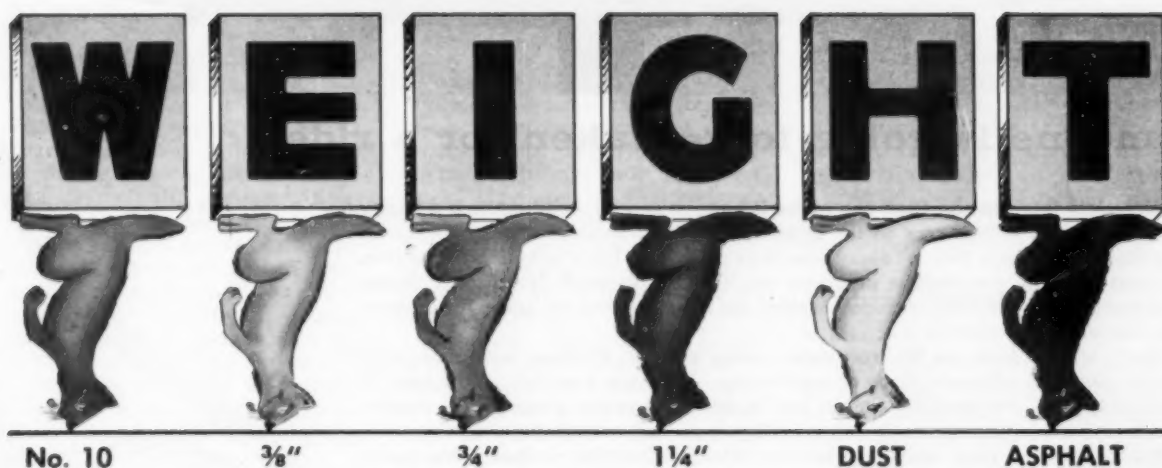
East Coast-Gulf Division: L. P. Street, American Bitumuls & Asphalt Co., Baltimore, and R. B. Lewis, Shell Oil Co., N. Y.; Great Lakes-Ohio Valley Division: P. C. Doyle, Standard Oil Co. of Ohio, Cleveland, and J. S. Van Pelt, Berry Refining Co., Chicago; Midwest Division: F. E. Widger, The Texas Co., Chicago, and E. M. Stone, Empire Petroleum Co., Denver; Southwest Division: J. W. Lackey, Malco Refineries Inc., Roswell, N. M., and A. G. Finney, Jr., Houston, Tex.; Pacific Coast Division: E. J. Barnes, Macmillan Petroleum Corp., Los Angeles, Calif., and H. D. Webb, Envoy Petroleum Co., Long Beach, Calif.

It was voted to hold the annual midyear meeting at Glenwood Springs, Colo., in June.

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Simplicity Automatic Equipment is available **ONLY** on Simplicity asphalt plants, new or old.

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ROADS AND STREETS, February, 1958



Someone is going to get taken for a ride

A Materials Interchange Plan can make it happen sooner—and make it a happy one . . . with 65 million cars on the highway—20 million more in 10 years—someone is getting taken for a ride . . . every minute of every day. Let's make it a happy ride. Current highway construction programs can do it. A *Materials Interchange* design and specification plan that includes Asphalt can help grandma get taken for a pleasant ride sooner.

Here's what at least one Midwest state is doing about it: Highway authorities have drawn plans for alternate types of construction. Materials available at the time of construction will be used. No time is lost in this construction program. No experienced engineering manpower is lost rewriting specs and redesigning projects.

Make this your plan. Employ *Materials Interchangeability* so that roads under your authority may be built from materials available at time of construction. Include Asphalt in your construction planning.

Remember these facts: Standard Oil produces Asphalt at four convenient Midwest locations. Tank car and tank truck deliveries are made to you from the Standard Oil refinery nearest your job. Technical Service on Asphalt for highway construction is provided by Asphalt construction specialists who work out of 23 Standard Oil offices all over the 15 Midwest and Rocky Mountain states. Standard Oil has a record of taking care of its customers demonstrated by its delivery on contracts in times of short supply as well as when materials are plentiful.

Get more facts about STANDARD Asphalt from the Standard Oil office nearest you. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

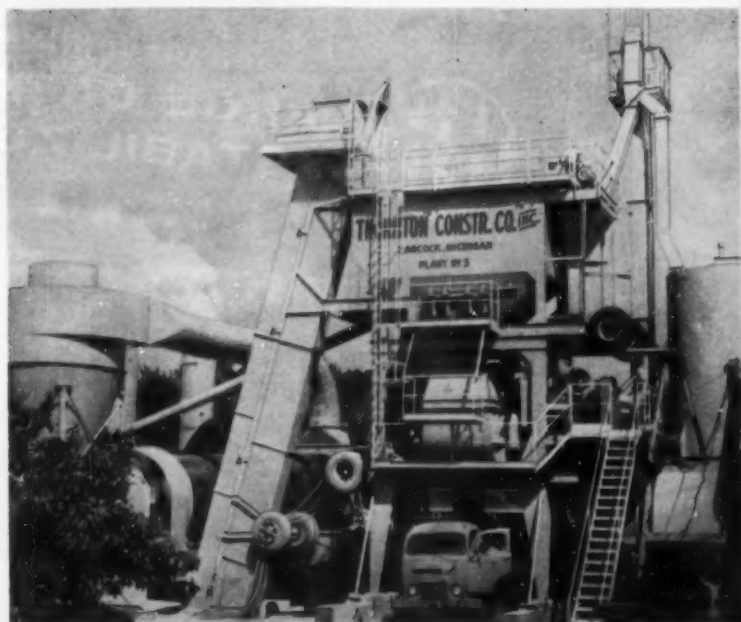
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STANDARD OIL COMPANY
(Indiana)

Big Capacity Plant Mixes Asphalt for Mackinac Bridge

(See front cover)



● Madsen 6,000-lb. batch capacity asphalt plant. This model of plant served the paving of the Mackinac Bridge project.

BIGNESS THROUGHOUT, complete portability and fast automatic operation are key characteristics of the new Madsen model 481 6,000-lb. batch capacity asphalt plant recently set up at St. Ignace, Mich. Its purpose was to mix bituminous concrete for paving the approaches and roadway of Michigan's new Mackinac Bridge.

Thornton Construction Co., Inc., of Hancock, Mich., owners of the plant, handled this important phase of work on this, the world's longest suspension bridge. Capable of turning out considerably more than 200 tph the plant was literally "loafing" on this particular job because of the conditions under which the contractor had to operate. On the approaches alone there is a total of 90 joints. The considerable amount of special work entailed on each of the joints and at other points held down production.

An indication of the plant's capabilities was shown on a highway job which Thornton handled a few months earlier when they paved about 19 miles on U.S. 2 between Naubinway and Brevort, Mich. On the base course, with a mix cycle of 63 seconds, the firm turned out 175 tph. For the top course with a 74-second mixing cycle, they produced 140 tph of close-specification mix.

Designed to handle today's fast-moving asphalt paving jobs, this

big plant is completely portable. Transport wheel equipment is furnished for the screen bin section, mixer weigh-box section, hot stone elevator and dryer. Dust collector and dust washer may also be wheel equipped. The plant optionally features fully automatic operation. By the pressing of a single button, operator can weigh out four different sizes of aggregate, weigh out the asphalt, discharge aggregates into mixer, dry mix the aggregates, inject the asphalt, wet mix for a predetermined length of time and discharge the mix into the dump truck. The unit will re-cycle as many batches as desired up to 400. A choice of three different specification mixes can be made merely by flipping the selector switch to the mix desired.

Following the trend to larger bins, this plant incorporates a 4-compartment, 50-ton-capacity bin. An exclusive feature is three openings in each bin compartment which speed charging of the weigh-box and eliminate segregation. The weigh-box has a gross level full capacity of 120 cu. ft. and a working capacity of 100 cu. ft. It has an air-operated gate, four point lever suspension roller mounted so that it may be quickly rolled out of the way for field maintenance.

The Madsen Model 440 twin shaft pug mill mixer is utilized in the Model 481 plant. This 6,000-

lb. mixer has a capacity of 64 cu. ft. below the centerline of the mixing shafts and a 135 cu. ft. net capacity level full.

Furnished also with Thornton's plant is a Madsen 96-in. diameter by 40 ft. long dryer. It has a special designed internal lifters which in conjunction with the low-pressure burner assembly, 75 hp burner blower and a conical firebox with secondary air inlets and hammered-in refractory, is capable of drying upwards of 180 tons of aggregate per hour to a .018% moisture content. Plant is also equipped with a 12 ft. diameter cyclone dust collector and heavy duty, exhaustor plus a triple wet tube dust washer.

Right to Condemn Land Upheld in Illinois

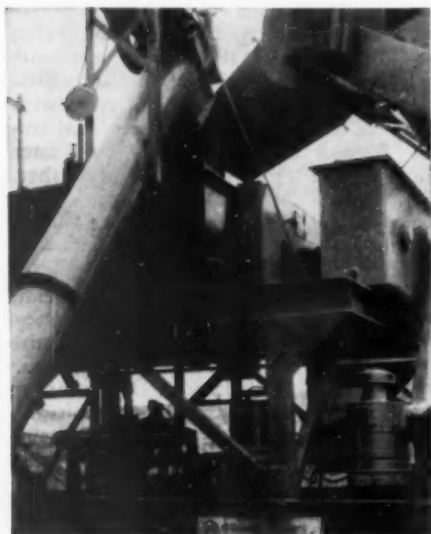
A ruling of the Illinois Supreme Court finally has given authority to the Illinois Toll Road Commission to condemn land for highways.

Coming belatedly, following much difficulty by the Commission and costly delays in the construction program, this ruling is foreseen to have a stabilizing effect on future road building in the state.

The case had been appealed from the Cook County Superior Court, with land owners contending that the Commission had power to condemn only land previously devoted to highway use.



to provide accurate proportioning and control of base materials in large capacity operations



To provide . . . in large capacity operations—the more accurate proportioning and control of base materials which so many state highway departments are requiring, H & B engineers have developed two new Stabilizers, to provide capacity up to 400 cu. yds. per hour.

Both of these Stabilizers are unit type plants, with individual units operated by electric drives. The feeder, mixer, and aggregate conveyor are wheel mounted, to permit operation in running position without jacking up or cribbing. The units include:

FEEDER: equipped to proportion two sizes of aggregate onto belt.

AGGREGATE CONVEYOR: belt type, carrying aggregate from feeder to mixer.

MIXER: Twin shaft, continuous pug-mill type, driven by Diesel power unit, and equipped for introducing water into mix.

CEMENT CONVEYOR: electrically driven, with variable speed drive, permitting accurate control of proportioning.

ELECTRIC DRIVES: permitting the feeding of aggregate, cement and water to be started and stopped simultaneously with one push button.

Complete information on either of these Stabilizers will be furnished on request.

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Meetings

AMERICAN CONCRETE INSTITUTE—Annual Convention, Morrison Hotel, Chicago, Illinois; Feb. 24-27.

ILLINOIS HIGHWAY ENGINEERING CONFERENCE—University of Illinois, 203 Civil Engineering Hall, Urbana, Ill.; Feb. 25-27.

AMERICAN SOCIETY OF CIVIL ENGINEERS—Winter Convention, Chicago, Ill.; Feb. 24-28.

ASSOCIATION OF HIGHWAY OFFICIALS OF NORTH ATLANTIC STATES—34th Annual Meeting & Convention, Hotel Emerson, Baltimore, Md.; Feb. 26-28.

ILLINOIS TRAFFIC ENGINEERING CONFERENCE—University of Illinois, 203 Civil Engineering Hall, Urbana, Ill.; Feb. 27-28.

UNIVERSITY OF UTAH CIVIL ENGINEERING DEPT.—19th Annual Highway Conference, Student Union Building, Salt Lake City, Utah; March 3-5.

READY MIX CONCRETE ASSOCIATION OF WISCONSIN—Annual Convention, Plankinton Hotel, Milwaukee, Wis., March 10-12.

NEW YORK STATE ASSOCIATION OF HIGHWAY ENGINEERS—Annual Meeting, Manger Hotel, Rochester, N.Y.; March 26-28.

Welding Society Meeting

The American Welding Society will hold its annual welding show in St. Louis April 15-17 at Kiel Auditorium. The annual technical meeting will be held at the hotel Statler April 14-18. An informal welding conference, on a less technical basis, will be held concurrently.

The show is expected to break all attendance records. A total of 33,664 sq. ft. of exhibit space will be used. About 125 companies will conduct demonstrations of their products.

Visitors who wish hotel information or program details should write the American Welding Society, c/o Robert T. Kenworthy, Exposition Management, 12 E. 41st Street, New York 17, New York.

ROSCO'S PRESSURE METERING

MAKES THE DIFFERENCE AT ANY WIDTH!

Do you know...

that it's possible to apply bitumen through any length of spraybar from 1 to 24 feet without changing the pressure and without any application adjustment? It can be done with a Rosco! You would normally expect surges or drops in pressure to occur when sections of a distributor's spraybar are shut-off or turned on.

But...

NOT with a Rosco Distributor equipped with exclusive Pressure Metering. Even when as much as 23 feet of a 24-foot spraybar are shut-off, the precise, accurate delivery remains unaffected... the pressure in the working one foot stays the same as it was pre-set at the beginning of the run. The accurate delivery from the working nozzles is not affected... no matter how many feet of the bar are cut out.

No adjustments in truck or pump speed are required—in fact, with Pressure Metering the pump speed never changes and normal wear of the pump never affects the accuracy of the application. When any part of the spraybar is shut off, the excess material is automatically by-passed. Pressure at the operating nozzles stays the same. When additional nozzles are turned on, pressure is immediately available to supply them.

One control sets the pressure specified for the job. After that, pressure control is automatic... the operator can concentrate full attention to spotting the material properly on the road. Pressure Metering is an integral part of Rosco's patented Master Valve that permits one-lever control of all normal distributor functions. You'll find that Rosco's Pressure Metering is faster and more accurate—factors which can be the difference between a "make" or "break" job in today's highly competitive field. And Rosco's Pressure Metering assures you of jobs that will always meet rigid application specifications.

Let your Rosco dealer show you how Pressure Metering will pay off for you. Or write the factory for descriptive literature with specifications on Pressure Metering-equipped Distributors.



ROSCO BITUMINOUS DISTRIBUTOR with Pressure Metering. Front or rear mounted for truck or trailer.

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Accident Prevention Can Cut Insurance Costs

By H. E. Beaven

Manager, Home Office Division
Engineering Department,
American Mutual Liability Insurance Co.,
Boston, Mass.

(From "Safety Newsletter," of National Safety Council, Construction Section)

Too few construction contractors are aware of the heavy financial impact that a bad accident record can have on the price they can bid. Too many take the attitude that insurance is just one of those things they have to buy, not realizing that the amount can be cut materially by a good accident-experience record, plus advice from an insurance company as to the type of liability insurance needed for the job being bid.

The construction industry always has had a very much worse accident record than the manufacturing industries. That is due, in large part, to the much higher turnover in employees from job to job. Hence the continuing need for a well planned program of accident prevention on each job.

In general, the construction contractor is concerned with two major categories of insurance — workmen's compensation insurance and public-liability insurance.

Workmen's Compensation Insurance. Under the workmen's compensation laws of each state the insurance commissioner sets a manual rate for each classification of work such as masonry or excavation. But in addition to this all states now have in operation an experience-rating plan that applies to all contractors operating within the state. Under that plan, a contractor with a good experience record receives the benefit of a percentage reduction below the manual rate, and those with a bad record must pay a percentage above the manual rate.

It is not impossible for such increased insurance rates to become double the manual rate.

This experience-rate modification earned by a contractor follows him from insurance carrier to insurance carrier under the supervision of the state insurance commissioner. Hence a contractor cannot escape from an unfavorable experience-rate modification by changing his insurance company. He must do something about

reducing accidents on his jobs.

An Adequate Safety Program. The elements of a well organized safety program are these:

1. Top management sets policy.
2. Responsibility for carrying out the policy of accident prevention should follow the normal line of authority.
3. Safe methods planning is fundamental in the safe operation of a construction project.
4. Use of standards is important in the safe operation of a job.
5. Education of supervisors and workers must be a continuing process on a construction job.
6. Investigation of accidents which occur in spite of efforts to have no accidents should be immediately and carefully made by representatives of the contractor including the foreman of the gang involved.
7. Inspection of the job should be a continuous function of every operation supervisor.
8. First-aid facilities properly equipped to take care of the kind of accidents that may happen on a project are important to prevent the minor injuries from becoming more serious through neglect or delay in treatment.
9. Accident records should be kept just like job progress reports.
10. Review of accident investigations, inspection reports, and accident records should be made a part of the daily control.

Insurance companies stand ready to help contractors to develop such a program, but it is up to the purchaser to make full use of the advice. In the last analysis, the good results are obtained by good management: the good management of the contractor's own organization.

Crane Accidents Studied By National Safety Council

Improper use of crawler, truck and locomotive cranes can result in permanent disability or death to workers and loss of money to management from damaged equipment or loads and costly delays.

The National Safety Council, in a recent data sheet entitled "Crawler Truck and Similar Cranes," reports that an analysis of crane accidents shows that the most dangerous area is near a load, with 41 percent of all injuries happening

there.

Data sheet D-448, prepared and reviewed by safety engineers, all experts in the field, give this breakdown of crane injuries occurring other than in the load area:

Unsafe practices by operators, and operating too near obstructions and stationary equipment—12 percent.

Violations of safe practices in fueling, checking water and other maintenance work—11 percent.

Other factors contributing to crane accidents are failure of defective booms, cables and sheaves, working or standing in the line of swing of a crane cab or boom and jumping off or climbing on cranes without using handholds.

One of the chief crane operating hazards is electricity. If booms or hoist lines contact power lines, death-dealing shock may result. Before operating a crane near power lines, consult a power company for safety recommendations. An electronic safety device that warns of the nearness of power lines is available commercially.

The analysis, according to the data sheet, one of many prepared periodically by safety experts, indicates a need for observance of three basic steps:

1. Require regular and thorough inspections of hooks, slings, cables, booms and other vital parts, and keep them in safe condition.
2. Train operators, hitchers, riggers and other workers in safe practices.
3. Require them to observe safe practices.

In addition, the data sheet gives more specific information on signals, boom stops and slings.

Record Salt Use Reported For Roads and Streets

A record quantity of more than two million tons of salt for snow and ice control was ordered for use during the current winter by state highway authorities and municipal street officials.

So announces the Salt Producers Association, which states that a 25 percent increase from the past season reflects the growing demand for salt for this use. Salt for ice control has jumped 2½ times in volume in the past five years. This is due, according to the Association, to the rising demand for bare pavement and safe, "traffic as usual" conditions in winter. The straight salt or solution replaces the use of cinders or sand which involve larger volume of materials to be handled.

YOU CAN'T BARGAIN WITH SAFETY

Lifting heavy beams for steel-skeletoned skyscrapers, over the heads of pedestrian and vehicular traffic, calls for careful loading — with safe slings, stout wire rope and a crane that's securely guyed with steel cables. Structural steelworkers practice safety because they know that...

Life depends on it

Today, taller buildings, bigger bridges, deeper oil wells, greater construction projects require stronger, safer wire rope. And equipment operators know that when you buy "bargain" rope you're heading for headaches, trouble and expense. So don't bargain with safety. Buy wire rope on the basis of *quality*. Buy Wickwire Rope.



**LOOK FOR THE
YELLOW TRIANGLE**

**PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION**

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver
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San Francisco • San Leandro • Seattle • Spokane • **WICKWIRE SPENCER STEEL DIVISION**—Boston • Buffalo • Chattanooga
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... for more details circle 260 on enclosed return postal card

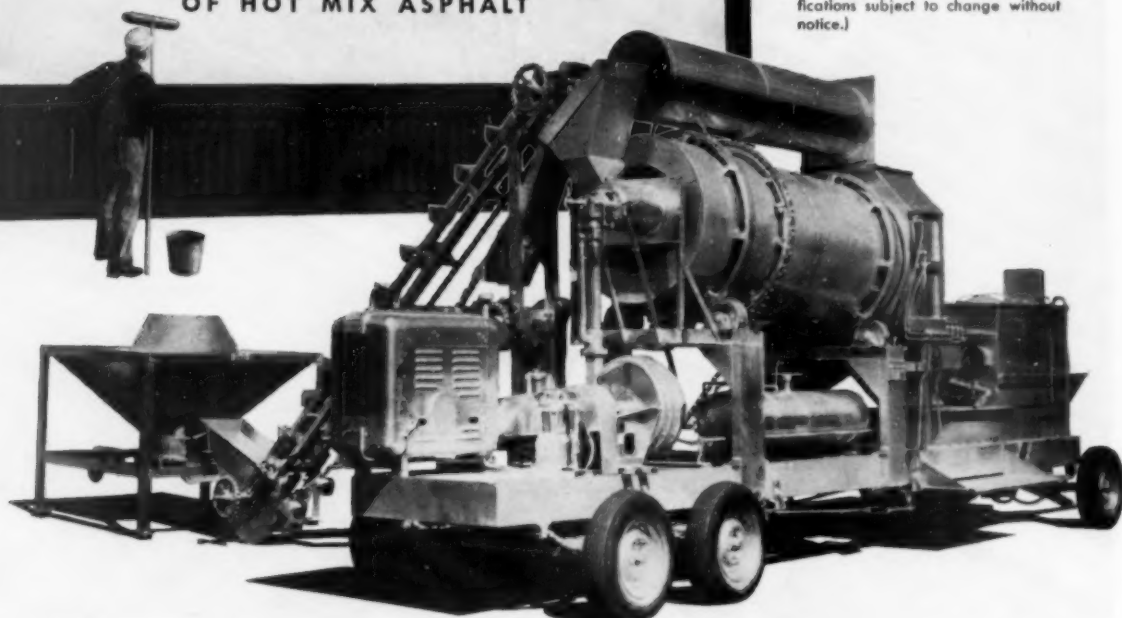
ROADS AND STREETS, February, 1958

5696

THIS NEW \$13,900* **White** ASPHALT PLANT

FREE

WITH YOUR NEXT 6,000 TONS
OF HOT MIX ASPHALT



*F.O.B. PRICES FOR L-20
Portable (illustrated).....\$13,900
Stationary model.....\$13,400
Complete and ready to operate.
Includes 52" x 12' dryer, 1/2 ton
batch mixer, 225 gal. kettle, 50 HP
engine or 30 HP motor, feeder.
TERMS available. (Prices and speci-
fications subject to change without
notice.)

Pictured is the new L-20 White Asphalt Plant that produces twenty tons of HOT mix per hour... not 150 or 200 degree mix, but 300 plus degree mix! That's enough capacity to pave driveways, parking lots, filling stations, school yards, suburban streets, or do state highway maintenance. Two men run the plant. Produces the same asphalt as a \$100,000 plant... hot mix, RC, MC, SC Emulsion for top course, base course, one course or patch.

Extra profit of over \$350.00 a day
Successor to the popular White L-10, the L-20

asphalt plant is even more efficient, more profitable to black-top contractors, municipalities, or state highway commissions. Produce your own asphalt at a price that will save you an average of \$2.30 per ton. At that rate, your White L-20 pays for itself—in effect is "free—with the first 6,000 tons" you use or sell to other contractors. And, remember: operating the L-20 eight hours a day, you can produce 6,000 tons in about 40 working days. With each full production day after that, pocket the extra profit of over \$350.00 a day!

See
your nearest

White

distributor
or write today
for further
particulars.

ALABAMA

Birmingham—Leary & Owens
Mach. Co.
Montgomery—Leary & Owens
Equip. Co.

ARIZONA

Phoenix—Equipment Sales Co.

ARKANSAS

Little Rock—Moody Supply Co.

COLORADO

Grand Junction—S & M Supply Co.

CONNECTICUT

New Haven—Cassidy-Gesner Equip.
Corp.

DELAWARE

Dover—Chesapeake Supply &
Equip. Corp.

GEORGIA

Atlanta—W. C. Caye and Co.

IDAHO

Boise—Intermountain Equip. Co.

ILLINOIS

Peoria—Illinois Contr. Mach. Inc.
Moline Park—Hiltman Equip. Co.

INDIANA

Evansville—Ram Supply Co.
Fort Wayne—Stockberger Machy.
Indianapolis—M. S. Churchman Co.

IOWA

Cedar Rapids—McNall Mach. &
Supply Co.

KANSAS

Wichita—Hutchinson Fdry. &
Steel Co.

KENTUCKY

Louisville—Elrod Equip. Co.

LOUISIANA

New Orleans—Woodward, Wight &
Co. Ltd.

MAINE

Augusta—Parker-Danner Co.

MASSACHUSETTS

Fall River—S. B. MacDonald

MARYLAND

Baltimore—Chesapeake Supply &
Equip. Corp.

MICHIGAN

Detroit—Acme Equip. Co.
Grand Rapids—E. R. S. Equip. Co.

NEBRASKA

Lincoln—Highway Equip. & Sup. Co.

NEW JERSEY

Rewark—Johnson & Dealman, Inc.

NEW YORK

Albany—Contractors Sales & Serv.
Buffalo—Cameron Equip. Co.
Huntington, L.I.—Rand-MacMurray

NORTH CAROLINA

Charlotte—H.B. Owsley & Son

OHIO

Columbus—W.W. Williams Co.

OKLAHOMA

Tulsa—Tulsa Machy. Co.

OREGON

Portland—Howard-Conger Corp.

PENNSYLVANIA

Bridgeville—Anderson Equip. Co.
Forty Fort—Bussler Equip. Co.
Philadelphia—Edeten & Boyer Co.

TENNESSEE

Knoxville—Story Brothers Equip.
Memphis—Tri-State Equip. Co.
Nashville—Buchanan Equip. Co.

TEXAS

Dallas—Road Equip. Co.
Houston—Goddard Machy. Co.
Longview—Southwestern Equip. Co.
Lubbock—Plains Machy. Co.
San Antonio—Grand Machy. &
Supply Co.

UTAH

Salt Lake City—The Long Construc-
tion Equip. Co.

VERMONT

Barre—Raymonds and Son

VIRGINIA

Richmond—Highway Mach. &
Supply Co.

WEST VIRGINIA

Huntington—Banks-Mittor Sup. Co.

WISCONSIN

Milwaukee—Kelbo Bros. Equip. Co.

ALASKA

Seattle, Washington—Northern
Commercial Co.

CANADA

Edmonton, Alberta—Gorman's Ltd.
Vancouver, B.C.—Air Equip. Service
Ltd.

Winnipeg, Manitoba—Mumford-
Medland, Ltd.

St. John, N.B.—Canastal Asphalt
Products, Ltd.

Halifax, N.S.—Coleman Machy. Co.,
Ltd.

New Toronto, Ontario—Dismuth
Equipment Ltd.

Kanata, Ontario—W.H. May, Ltd.

Ottawa, Ontario—Craig Construction
Equip. Ltd.

Montreal, Quebec—LaSalle Equip.
Co., Inc.

Regina, Saskatchewan—Kramer
Tractor Co.

HAWAII

Honolulu—Schuman Carriage Co.

EXPORT

New York, New York—Brown and
Siles Co., Inc.

White Manufacturing Company, Elkhart 2, Indiana

... for more details circle 330 on enclosed return postal card

Manufacturers' Literature

FILM ON AERIAL MAPPING. Spartan Air Services Limited, and Canadian Aero Service Ltd., have just released a new motion picture "The Map Makers," which deals in detail with the applications of photogrammetry, the use of vertical aerial photographs in obtaining accurate measurements for mapping purposes for highways, bridges, railways, town planning, agriculture, siting special projects, and other uses.

The film is adapted for showing either to technical people or laymen. It is 16 mm color with sound and runs for 13 minutes. Available from Public Relations Dept., Spartan Air Services Limited, 74 Sparks St., Ottawa, Canada.

For more details circle 144 on
Enclosed Return Postal Card.

EPHEMERIS FOR 1958. A 96-page, pocket size booklet giving solar and stellar ephemeris for the current year, abridged from the American Nautical Almanac, together with tables, formulas, and descriptions of methods for convenience of surveyors. The new method for Polaris, introduced in 1956 cuts the time for determination to a

fraction of what was formerly required. The booklet is published by W. & L. E. Gurley, Troy, N.Y., manufacturers of surveying instruments, and will be sent free, upon request, to practicing surveyors, and engineers and to instructors and students of surveying.

For more details circle 145 on
Enclosed Return Postal Card.

"THE INSPECTION DOOR IS OPEN," a booklet (Form DE-701) available from advertising Division, Caterpillar Tractor Co., Peoria, Ill., discusses aluminum alloy bearings on Cat engines. The publication is illustrated with photos of installations and Caterpillar testing and research facilities used to test bearings under the most trying field conditions.

For more details circle 146
Enclosed Return Postal Card.

BARNES MANUFACTURING CO., Mansfield, Ohio, has published an illustrated catalog date sheet giving latest information on electric-driven, self-priming antifugal pumps. A convenient selection table covering 21 direct-connected and belt-driven models is presented, along with complete specifications on the 1 to 50-hp pumps. Pumps offer capacities up to 1600 gal per minute.

For more details circle 147 on
Enclosed Return Postal Card.

BATCH TEST OVENS: Soiltest, Inc., 4711 W. North Ave., Chicago 39, Ill., has issued a new bulletin illustrating and describing batch ovens for rapid drying of aggregates, soils, and other construction materials. The electric batch ovens feature the new "Power-O-Matic" control which automatically proportions minimum wattage input in relation to the operating temperature and work load. Oven sizes range from the small model of 16 cu ft capacity to the large model of 96 cu ft.

For more details circle 148 on
Enclosed Return Postal Card.

BARBER-GREENE CO., 400 No. Highland Ave., Aurora, Ill. has announced a 4-page bulletin telling the story of a low-cost method of mixing stabilized materials at high capacity in their Model 828 "Stabilization Plant," adaptable to handling water-mixed stabilized base materials.

For more details circle 149 on
Enclosed Return Postal Card.



WHAT ABOUT YOU, MR. READER?

Are you still active in the field? Have you moved or changed your position?

Unless you send this information directly to us we can't be sure. Sometimes a reader's name is cut from the mailing list because we are not sure that our information as to name, title and address is right. Your name might be cut from the mailing list.

Don't Let This Happen to You

Even if you think we know all about you, please fill in the information requested below and send to us by return mail. Our auditors require proof of accuracy of our mailing list. *You* are the only person who can help us on this. Do it now before you forget, so you can be sure your magazine will always be properly addressed to you. New names cannot be added or old names retained on our list unless we have all this information. *Please print or type.*

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CITY _____

(If you have moved give old and new address)

ZONE (if any) _____

STATE _____

SIGNATURE _____

Ave., Aurora, Ill., has announced a 4-page bulletin telling the story of a low-cost method of mixing stabilized materials at high capacity in their Model 828 "Stabilization Plant", adaptable to handling water-mixed stabilized base materials. The Model 828 provides great flexibility in planning installations. Features contributing to this flexibility include a variety of power units, metering pumps, twin-shaft pug-mill, and hydraulically operated 5-cu yd discharge hopper.

For more details circle 149 on
Enclosed Return Postal Card.

SHOVEL SPECIFICATIONS: Schield Bantam Co., Waterloo, Iowa has announced availability of specification bulletin (A-265) describing its newly designed shovel attachment. Included are complete shovel specifications, digging and lifting charts and photographs of both the $\frac{3}{8}$ -cu yd digging bucket and a special $\frac{1}{2}$ -yd rehandling bucket.

For more details circle 150 on
Enclosed Return Postal Card.

CATALOG ON NEW CONVERTIBLE: Koehring Division, 3026 W. Concordia Ave., Milwaukee 16, Wis., has released a new 4-page bulletin on its crawler-mounted 805 excavator, recently placed in production. The 805 can be used as a 2-cu yd shovel, 2 to 3-cu yd dragline or clamshell, or 52-ton lift crane. Photo-

graphs show job applications and carbody, upper machinery, lower crawler forms, and lower crawler assemblies.

For more details circle 151 on
Enclosed Return Postal Card.

MULTI-STAGE PUMPS: A 6-page illustrated catalog of 3, 4, 6 and 8-stage, volute type pumps for heads from 460 to 2400 ft. and capacities from 200 to 2800 gpm. Ingersoll Rand Co., 400 W. Madison St., Chicago 6, Ill.

For more details circle 152 on
Enclosed Return Postal Card.

NEW ROTARY AIR COMPRESSORS are illustrated and described in an 8-page brochure, available from Dept. A, American Brake Shoe Co., 530 Fifth Ave., New York 36, N. Y. These 1-2 hp pumps supply air in 150-175 psi range. Brochure explains principle of operation with customary diagrams, describes special features, and details operating and mounting specifications.

For more details circle 153 on
Enclosed Return Postal Card.

"ALCOA ALUMINUM HIGHWAY RAILINGS", a new booklet, available from Aluminum Company of America, Room 727, Alcoa Building, Pittsburgh 29, Pa., covers all phases of the use of aluminum as railings on bridges and roadways. Over 30 models of parapet

railing post designs are offered, including 18 available for the first time. With each of these new posts, complete photographic coverage of actual installations is pictured. Engineering and architectural considerations are briefed. Problems of design for every conceivable installation are covered. Two sections are concerned with construction specifications and tests of materials.

For more details circle 154 on
Enclosed Return Postal Card.

INDUSTRIAL FINISHES COMPANY, INC., 1119 Land Title Building, Broad and Chestnut Streets, Philadelphia 10, Pa., has issued an 8-page illustrated brochure on catalytic protective coatings, describing a wide range of IFCO industrial usage and product adaptability. Outstanding characteristics of these coatings are cited as tremendous adhesion, durability, and wear resistance, one coat application without pretreatment in many cases. Laboratory and field tests show high immunity to moisture and water. An air-drying speed of 5-10 minutes is reported.

For more details circle 155 on
Enclosed Return Postal Card.

CHAIN BELT COMPANY, Sales Promotion Department, Milwaukee 1, Wis., announces publication of its new catalog 610 titled "Mechanical Power Transmission and Conveying Machin-

OVERLOOKING THE GULF

THE **Buena Vista**
BEACH HOTEL
and MOTEL



100% AIR-CONDITIONED

Wide Sand Beach - Pool - Pier and Boat Dock - Fishing - Sailing - Shuffleboard - Television - Free Parking - Dining Room - Coffee Grill - Marine Room - Cocktail Lounge - Entertainment - Near All Activities and 3 Splendid Golf Courses.

WRITE FOR BROCHURE AND RATES
Jimmy Love, General Manager

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MISSISSIPPI

Convenient location
and sensible rates...

ALEXANDRIA
HOTEL



The famed Alexandria, rich in the tradition of colorful Los Angeles, again takes its place as one of the city's great hotels — completely modernized and beautifully appointed. New Ownership and Management.

In the heart of Business, Financial, and Theatrical districts. 5 minutes from Rail, Bus and Airline Terminals. 500 rooms with bath—Radio & TV. Coffee Shop. Cocktail Lounge, Bar. Penthouse Sundeck. Drive-in Garage. Family Rate Plan.

GEORGE H. KARLIN, MANAGING DIRECTOR
You'll enjoy The NEW LANDMARK Dining Room | FREE PARKING (overnight)

5th and Spring Sts.

Los Angeles

Immediate Confirmation of Reservations

ALLIED RESERVATION CENTERS	LOS ANGELES SAN FRANCISCO CHICAGO	Alexandria Hotel 209 Post Street 58 E. Washington St.	MA 4-7484 CA 1-5473 ST 2-7716
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ery." It contains descriptions, specifications, application information and selection data on Chain Belt products for power transmission, conveying and elevating service.

For more details circle 156 on
Enclosed Return Postal Card.

DEVELOPMENTS IN TIMBER STRUCTURES: Twenty-five years (1933-1957) of continuous service to the wood and wood using industries is depicted pictorially in the anniversary report of Timber Engineering Company, research and engineering affiliate of the National Lumber Manufacturers Association. The company has become a clearing house for technical data on the design and building in engineered timber and some of its developments, most notably the "TECO" connector, have revolutionized the use of wood as an engineering material.

Since the opening of the company's laboratory in 1943, more than 600 projects in 48 different fields have been carried out for companies, associations, and government agencies. A 622-page "Timber Design and Construction Handbook" has recently been prepared and made available. Copies of "Our Twenty-fifth year", the 28-page Brochure here described, may be had without charge, from Timber Engineering Co., 1319 - 18th St., N. W., Washington, D. C.

For more details circle 157 on
Enclosed Return Postal Card.

VIBRATING SCREEN CATALOG: A new 16-page catalog is available from the Deister Machine Company, 1933 East Wayne St., Fort Wayne 4, Ind. It describes the four basic types of Deister vibrating screens designed to size crushed stone, gravel, and slag, aggregates for hot-mix asphalt, and also for the classification of other screenable materials.

For more details circle 158 on
Enclosed Return Postal Card.

FORMS, TIES, AND CONSTRUCTION SPECIALTIES: A new 36-page catalog which illustrates and describes their complete line of concrete forms, form ties, accessories, construction specialties and highway products has just been issued by Universal Form Clamp Co., 1238 N. Kostner Ave., Chicago 51.

For more details circle 159 on
Enclosed Return Postal Card.

CHEMICAL WEED AND BRUSH CONTROL: A 24-page bulletin from Monsanto Chemical Co. points out that various formulations of 2, 4-D and 2, 4, 5-T and mixtures of these chemicals now make possible year-round programs of foliage, basal and stump spraying for maximum weed and brush control at substantial long-term savings of time and money. A chart which lists more than 50 common woody

plants controllable with 2, 4-D, 2, 4, 5-T and combinations of these chemicals, and the recommended rates of foliage spray for each, are included. Available on request from Mrs. Sharon Clayton, Organic Chemicals Division, Monsanto Chemical Company, St. Louis 24, Mo.

For more details circle 160 on
Enclosed Return Postal Card.

PHYSICAL TESTING EQUIPMENT FOR CONSTRUCTIONAL MATERIALS is described in 12-page Bulletin 55 just released by the Tinius Olsen Testing Machine Co., 7634 Easton Road, Willow Grove, Pa.

Details and specifications are given on laboratory-type compression testing machines, Super "L" hydraulic compression machines with electronic load indication, semi-portable concrete block cylinder and beam testers.

For more details circle 161 on
Enclosed Return Postal Card.

CRAWLER TRACTOR, 20 page catalog CR-634G, on the International TD-24 torque converter or gear drive crawler tractor is available from Consumer Relations Dept., International Harvester Co., 180 N. Michigan Ave., Chicago,

For more details circle 162 on
Enclosed Return Postal Card.

NEW DESIGN! NEW EFFICIENCY!



Asphalt men designed it. Asphalt men tested it. The new Standard Asphalt Distributor has been field tested for two years on every type and grade of asphalt available, over three million gallons in all.

MODEL 424-56 PRESSURE DISTRIBUTOR

New power, New pump, All new features—as follows: A new "Econo-bar" spray bar in addition to the famous Standard Steel "Miracle" spray bar. New hydraulic spray bar lift. More convenient, easier to operate controls. Shorter, simplified piping to reduce heat bleed-off.

The Model 424-56 is built in 1000, 1250 and 1500 gallon capacities as standard and can be furnished in other capacities, either truck or semi-trailer mounted.

Write for Catalog #RS1256 or see your dealer.

OTHER PRODUCTS OF STANDARD STEEL
ASPHALT DISTRIBUTORS . . . BURNERS
... POWER AND TRACTION DRIVEN
CONSTRUCTION BROOMS . . . MAINTENANCE DISTRIBUTORS . . . TAR KETTLES
... AGGREGATE SPREADERS . . . PIPE LINE EQUIPMENT . . . SUPPLY TANKS
... SHELVING HARDWARE . . . AND AGRICULTURAL EQUIPMENT



Standard Steel Works, Inc., NORTH KANSAS CITY, MO.

PD 15

... for more details circle 319 on enclosed return postal card

With the Manufacturers and Distributors

WM. C. KURTZ has been appointed manager of truck tire sales for the General Tire & Rubber Company's Detroit sales division.

GENERAL MOTORS has started on a 289,000 sq ft addition to its Detroit Diesel Engine Division plant which is scheduled for completion next May. The new building will house all final assembly, testing and shipping facilities for Detroit Diesel. This is the 9th plant expansion program since the division's founding in 1937.

RALPH E. KEIDEL, manager of advertising and sales promotion for Euclid Division of General Motors, Cleveland, was elected General Chairman of Construction Equipment Advertisers at a recent meeting of the association in Chicago. He succeeds M. B. Jaeger of Bucyrus-Erie Co.

PROPOSED PLANS for merger of Dresser Industries, Inc., Dallas, Texas and Gardner-Denver Co., Quincy, Ill., have been abandoned.

ERLINDER EQUIPMENT CORPORATION, 12221 S. Indiana Ave., Chicago, Ill., has been appointed Chicago-area distributor by Daybrook Hydraulic Division, Young Spring & Wire Corp., Bowling Green, Ohio.

BUCYRUS ERIE Co., South Milwaukee, Wisc., has appointed Lewis C. Black assistant general sales manager in charge of sales of large machines and blast hole drills. He had been sales manager-large machines.

THE POWER TOOL Co., Prudential Plaza, Chicago, has announced the appointment of William J. McGraw as general sales manager, Walter G. Mitchell, as general manager of product development, and Milton E. Slater as sales manager of farm and ranch division.

EAGLE SIGNAL CORPORATION, Moline, Ill., announces the appointment of Traffic Engineer's Supply Corp., 5204 Lakeside Ave., Richmond 28, Va., as sales representative in the states of North Carolina, South Carolina, Virginia and West Virginia, except the pan-handle section.

JOHN D. JONES has been promoted to manager, Industrial Relations Section of the Tar Products Division, Koppers Company, Inc., it was announced by R. R. Holmes, vice president and general manager of the division. Formerly a labor relations assistant for the division, Mr. Jones succeeds A. K. Black II, resigned.



Manhattan's largest hotel with 2500 rooms, all with bath and free radio—television in many. Meditation Chapel open to all faiths. Midtown location. Direct entrance to Pennsylvania Station. Three air-conditioned restaurants LAMP POST CORNER . . . COFFEE HOUSE GOLDEN THREAD CAFE

Singles from \$7 | Doubles from \$11 | Suites from \$23

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CHARLES W. COLE, Gen Mgr

Other MASSAGLIA HOTELS

- SANTA MONICA, CALIF. Hotel Miramar
- SAN JOSE, CALIF. Hotel Santa Claire
- LONG BEACH, CALIF. Hotel Wilton
- GALLUP, N.M. Hotel El Rancho
- ALBUQUERQUE, Hotel Franciscan
- DENVER, COLO. Hotel Park Lane
- WASHINGTON, D.C. Hotel Raleigh
- HARTFORD, CONN. Hotel Bond
- PITTSBURGH, PA. Hotel Sharwyn
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SPREADS SALT 200 LBS. PER MILE OR IN ANY DESIRED AMOUNT

Lays a Narrow Strip or Full Traffic Lane

Handles all granular materials—salt, cinders, sand, calcium chloride, rock chips. Spreads at speeds up to 30 M.P.H. Clutch-controlled flow: steady or intermittent for hills and intersections.

Write for complete information

SWENSON SPREADER & MFG. CO.
LINDENWOOD, ILLINOIS

... for more details circle 315 on enclosed return postal card



LOOP HOTEL ROOMS

anytime to
PREFERRED GUESTS *

* During certain convention periods, all available Chicago hotel rooms are frequently taken.

You can be assured of comfortable accommodations in the heart of the Loop, anytime, by writing for your FREE "Preferred Guest Card" from the Hotel Hamilton, today. The Hamilton—preferred by the family, and business executives for downtown convenience and courteous hospitality at sensible rates—guarantees (with advance notice) reservations anytime of the year to you, the preferred guest. Ask for your "Preferred Guest Card", today at no obligation.

THE LITTLE
SQUARE
Chicago's newest
restaurant and
lounge



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HAMILTON HOTEL

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CHICAGO

IN KANSAS CITY,

IT'S THE BELLERIVE HOTEL

100% AIR-CONDITIONED

STRUCTURAL ENGINEERS DESIGNERS DRAFTSMEN

Prefer several years or more experience in any of these fields:

BRIDGES BUILDINGS EXPRESSWAYS HYDRO PROJECTS TEST FACILITIES*

Will consider lesser experience with good educational background, including several recent graduates to round out a planned expansion program. Occasional openings for combination field men. These are permanent additions to our regular staffs.

We are professional engineers engaged primarily in design which covers a wide scope of practice. The variety and unusual character—for example, the proposed world's largest bridge project—offer excellent opportunity for professional development and advancement.

Immediate openings in our St. Louis general offices and occasionally in our San Francisco branch office. Confidential interviews can also be obtained at Washington, D.C., and Portland, Oregon.

Paid vacation, sick leave, holiday, overtime. Excellent Employee Benefits Plan provides retirement income plus life and disability insurance. Blue Cross. Moving allowance.

Please write fully,
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Crane Booms for Models 3000-3500 and 3900 MANITOWOC units.

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If you are looking for the opportunity to grow with a nationally known manufacturer of road building and construction machinery, this is your chance. We are seeking an experienced man, 30-45 years old, as a sales specialist with headquarters in Milwaukee. Engineering degree or technical background desirable, but most important qualifications are experience and ability to supervise selling of concrete batching and road building machinery through distributors. Salary with all traveling expenses paid. Give personal statistics and experience history in reply. Replies confidential.

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Learn latest methods to organize and run work. Prepare for the top jobs. Send post card for details.
GEO. E. DEATHERAGE & SON
CONSTRUCTION CONSULTANTS
P.O. Box 921 Lake Worth, Florida

FOR SALE

- 1—Marsh Front Breaker - used 2 weeks. New price \$1,000.00 - Our price \$900.00.
- 1—Kamo Augering Motor & Drills - 18 H.P. Air Motor with track & roller attachment. 85' of 24" horizontal drill flight. 3 cutting heads - 24", 30" and 36". All new. New price \$5,500.00 - Our price \$3,850.00.
- 1—Model 407 Buckeye Trencher - used 1 month. New price \$16,000.00 - Our price \$12,400.00.
- 1—Model 203 Buckeye Trencher - digs 20" deep - 60" wide. Price - \$6,000.00
- 1—Model C-15 Buckeye Trencher - digs 20" deep - 42" wide. Price - \$7,500.00
- 1—Model 270 Cleveland Trencher - Factory overhauled, new condition, digs 54" wide by 18" deep - 1 1/2 years old. New price \$29,000.00 - Our price \$18,500.00.
- 1—Backhoe attachment for model 45 Bay City - Surplus, never used. Price - \$1,900.00.
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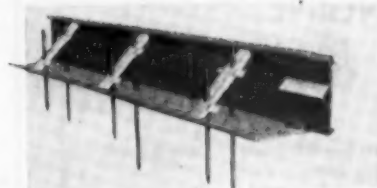


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CAT 60 Scrapers, like new. Each	4,150
CAT D8 Tractor, good undercarriage	2,750
CAT D7, 3T Series	2,750
LaPLANT-CHOATE C108 Scraper	3,500
LeTOURNEAU LS Scraper, 8-11 yds.	2,650
BUCYRUS 15B Backhoe, Crane Combination. Long and wide tracks, Buda Gas, GOOD	5,750
BUCYRUS-ERIE 56B Scraper, 6-8 yds.	2,950
NORTHWEST 25 Dragline, Cat. Diesel	5,500
HOUGH 4WD, HMD Loader, Diesel, 1 1/2 Yard	5,250
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Galion 8-12 Ton Roller, hyd. steer	1,250
Galion 8-12 Ton Roller, Diesel	2,750
Cat D17000 and 13000 Power Units. Each	1,850
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CARCO F. Winch for TD14, complete.	750
HYSTER D7M and D8N Towing Winches	
Schramm 105 Compressor	400
Williams 1/2 Yd. Clam. like new	750
OMAHA 3/4 Yd. Dragline Bucket	350
Chrysler Economy Water Pump	500
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CAT 23 DDPCU, good condition	1,000
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8 - New Armstrong 18:00 x 24 Nylon, 20 Ply Tires. Each	450

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*From w/star double acting.
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- 1—TANDEM AXLE TILT TOP TRAILER—8 ton.
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- (1) D-7 Cat w/Push Plate and DDP unit, S/N 7M4127 \$5,000

Scraper

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- (1) Worthington, 105 ft. Waukesha Gas Engine

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EXCLUSIVE CATERPILLAR "HI-ELECTRO" HARDENING MAKES STEEL TOUGH TO BREAK, HARD TO BEND

Result: New CAT Scraper and 'Dozer cutting edges, built to withstand increased demands of today's machines, are top buy.

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ROUGH JOBS like this put cutting edges to severe test. And here is where tough Caterpillar edges prove their superiority.

A quality edge starts with quality steel, tested in Caterpillar's laboratories for the right chemical composition and physical characteristics. Only steels meeting these exact specifications are accepted,

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Edges are heat treated by "Hi-Electro" hardening, a Caterpillar exclusive. This gives a deep, super-hard wear case. The core is left tough. The finished edge has an armor-like case and a shock-absorbing core.

Your Caterpillar Dealer has full information about the new Cat Scraper and 'Dozer cutting edges. See him today.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



CROSS SECTION of edge showing armor-like case and its shock-absorbing core.

CATERPILLAR

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"HI-ELECTRO" hardening machines at the Caterpillar factory give cutting edges the strength to resist breaking and bending.



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World's longest trench-type tunnel

McIntosh Studio photos

New 7,479-foot tunnel under Hampton Roads is paved with Texaco Asphaltic Concrete

Contractors

Merritt, Chapman & Scott
Corp., New York City
(General contractor)
Ames and Webb, Inc.
Norfolk, Va.
(Asphalt contractor)

This tunnel is part of a \$60 million bridge-tunnel facility which links Norfolk and Hampton, Va. across Hampton Roads. The tunnel lies between two man-made islands, each connected with the shore by a bridge.

Traffic through the tunnel in the beginning is expected to average 6,400 vehicles a day. This traffic, which will be concentrated in two lanes, is served by a hot-mix Texaco Asphaltic Concrete pavement. The pavement was laid in two courses, with a combined compacted thickness of four inches.

Rugged, flexible, joint-free Texaco Asphaltic Concrete is a heavy-duty pavement. Its ability to absorb punishing impact with a minimum of upkeep has been demonstrated in tunnels, on bridges, main highways and runways of major airports.

Hot-mix Texaco Asphaltic Concrete, constructed on a flexible base and subbase, is an ideal pavement for the Interstate Highway System. In addition to its proven durability,

superior riding quality and low maintenance, its initial cost is substantially lower than rigid paving of comparable design.

Helpful information about Hot-Mix Asphaltic Concrete and other types of asphalt paving is supplied in the booklet, "Plant-mixed Texaco Asphalt Paving." Our nearest office will be glad to send you a copy.



Laying hot-mix Texaco Asphaltic Concrete pavement on one of the approach ramps to tunnel under Hampton Roads.



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